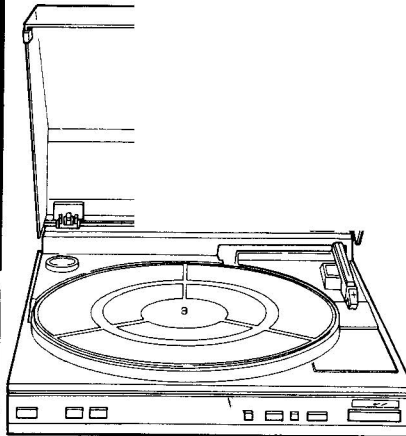


Service Manual

**CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS**

PIONEER



**ORDER NO.
ARP1209-A**

STEREO TURNTABLE

PL-X420(BK)

MODEL PL-X420 (BK) COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Power requirement	Destination
WEM	AC 220V-240V	European continent
WB	AC220V-240V	United Kingdom

- This service manual is applicable to the WEM and WB types.
- As to the WB type, please refer to pages 60.
- Ce manuel d'instruction se réfère au mode de réglage en français.
- Este manual de servicio trata del método ajuste escrito en español.

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PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: (03) 580-9911

1. SPECIFICATIONS

PHONOGRAPH MOTOR AND PLATTER

Motor type.....DC servo motor

Drive system.....Belt drive system

Speed of rotation.....2 speeds: 33-1/3, 45 rpm

**Wow and Flutter.....0.05% WRMS
±0.07% WTD Peak (DIN)**

S/N ratio68 dB (DIN-B)

**Platter.....Diameter 303 mm,
aluminium die cast**

TONE ARM

Type.....Integrated straight pipe arm

SUPPLIED CARTRIDGE (PC-295T)

Type	MM type
Replacement stylus	PN-295T
Stylus	0.6 mil diamond
Output voltage	2.5 mV (1 kHz, 5 cm/s LAT Peak)
Suitable stylus pressure	1 - 1.5 g (optimum value 1.25 g)
Frequency response	10 Hz - 30,000 Hz
Load resistance	50 k Ω
Weight	6 g

FUNCTIONS PROVIDED

Auto lead-in, auto return, auto cut, repeat, re-start function, arm elevation, manual play.

POWER SUPPLY, OTHER

Power requirements
European, U.K., Australian models.....AC 220 V — 240 V, 50,60 Hz
U.S., Canadian models.....AC 120 V, 60 Hz
Other destination modelsAC 110 V — 120 V/220 V — 240 V
(switchable), 50,60 Hz

Power consumption

European, U.K., Australian models	13 W
U.S., Canadian models	12 W
Other destination models.....	8 W

External dimensions.....i
362(W) x 100(H) x 355.5(D) mm
14 - 1/4(W) x 4(H) x 14(D) in

Net weight3.6 kg
8 lb

SUPPLIED ACCESSORIES

EP adaptor.....	1
Operating instructions.....	1

NOTE:

Specifications and design subject to possible modification without notice, due to improvements.

2. PANEL FACILITIES

EP Adaptor

When playing a record with a doughnut hole, place this over the platter spindle.

Cabinet

Dust Cover

Tone Arm

Cartridge (PC-295T)

Platter Spindle

Platter Mat

Platter

POWER Switch

Press to turn power to the unit ON and STAND-BY.

SIZE Selector Switch

Set this switch to the size of record which you intend to play.

[30] (When pressed in) — To play 30 cm LPs

[17] (When in the out position) — To play 17 cm EPs

SPEED Selector Switch

Set this switch to the rotation speed of the record which you intend to play.

[45] (When in the out position) — Platter rotates at 45 rpm.

[33] (When pressed in) — Platter rotates at 33 rpm.

REPEAT Switch

Press to perform repeat playback. When the switch is pressed in, the REPEAT indicator lights.

LOCATE Switch (FORWARD/REVERSE)

Use during manual play and when you want to change tracks. When pressed, the tone arm moves left or right.

[FORWARD] — Tone arm moves to the left.

[REVERSE] — Tone arm moves to the right.

ARM ELEVATION Switch

- Use to perform manual play.
- Use to temporarily stop playing.
- Use to change tracks in the middle of play. When changed, the tone arm moves up or down.

When [UP] lights — The tone arm rises. (The stylus is lifted off the record.)

When [DOWN] lights — The tone arm descends. (The stylus is lowered onto the record.)

STOP Switch

Press to stop play.

PLAY Switch

- Press to begin play.
- When pressed during FULL AUTO play, the turntable returns to the first track and begins playing from there. (Re-start function)

Indicators

- [UP] — Lit: Tone arm is in up position.
Not lit: Tone arm is moving.
- [REPEAT] — Lights during REPEAT play.
- [DOWN] — Tone arm is down.

3. DISASSEMBLY

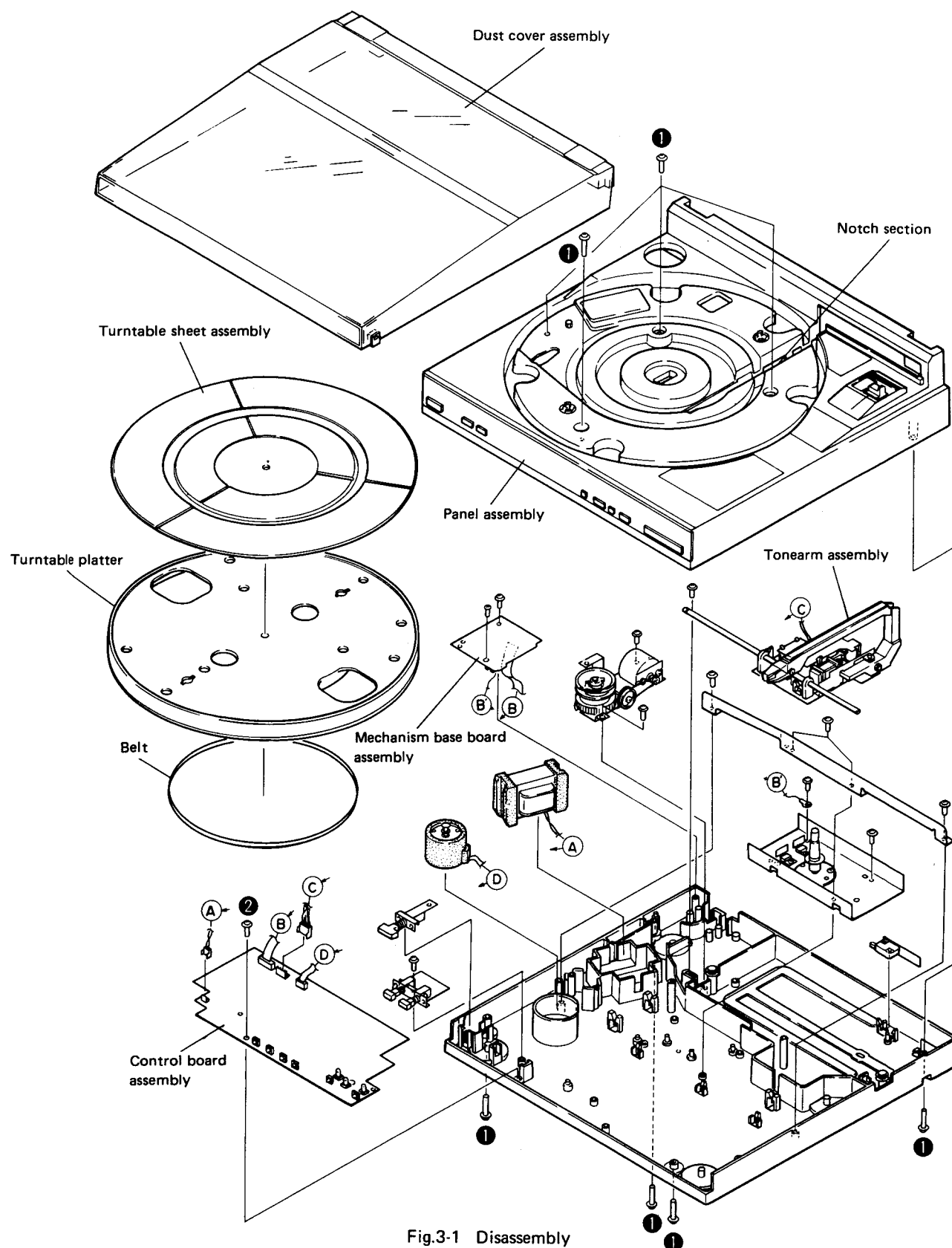


Fig.3-1 Disassembly

3.1 DISASSEMBLY

1. Open the dust cover and pull upward to remove it.
2. Position the tonearm at the lead-in groove of a record.
3. Remove the rubber mat, the platter, and the turntable belt.
4. Either manually or using the Arm Locate switch (<<), position the tonearm just above the section notched for panel removal.
5. After removing the 8 securing screws ❶ lift up the rear section of the panel assembly, remove the tonearm assembly from the notched section and remove the panel assembly by lifting it up and pulling forward.
6. Unscrew securing screw ❷ to remove the control board assembly.

3.2 CARRIAGE REMOVAL

1. Remove the fixer from the carriage and the wire from the pulley. (See Figure 3-2)
2. Remove the screw ❸ and pull the guide bar away from the carriage in the direction indicated by the arrow. The carriage and tonearm assembly can now be removed.
3. Removing the spring will release the carriage board assembly, and removing two screws ❹ will release the mechanism base board assembly.

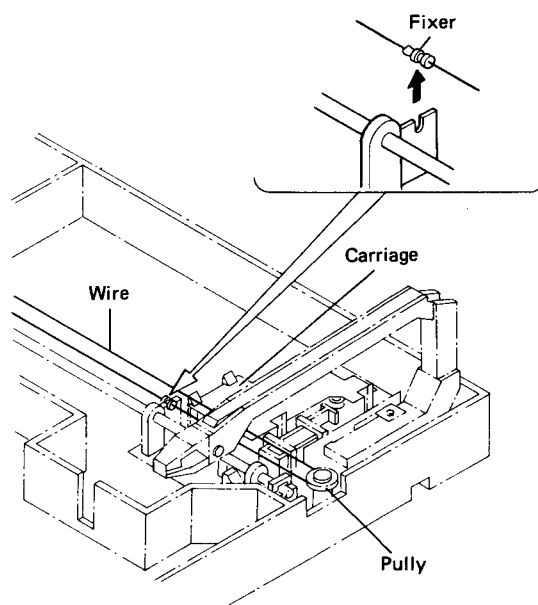


Fig.3-2 Removing Carriage Wire

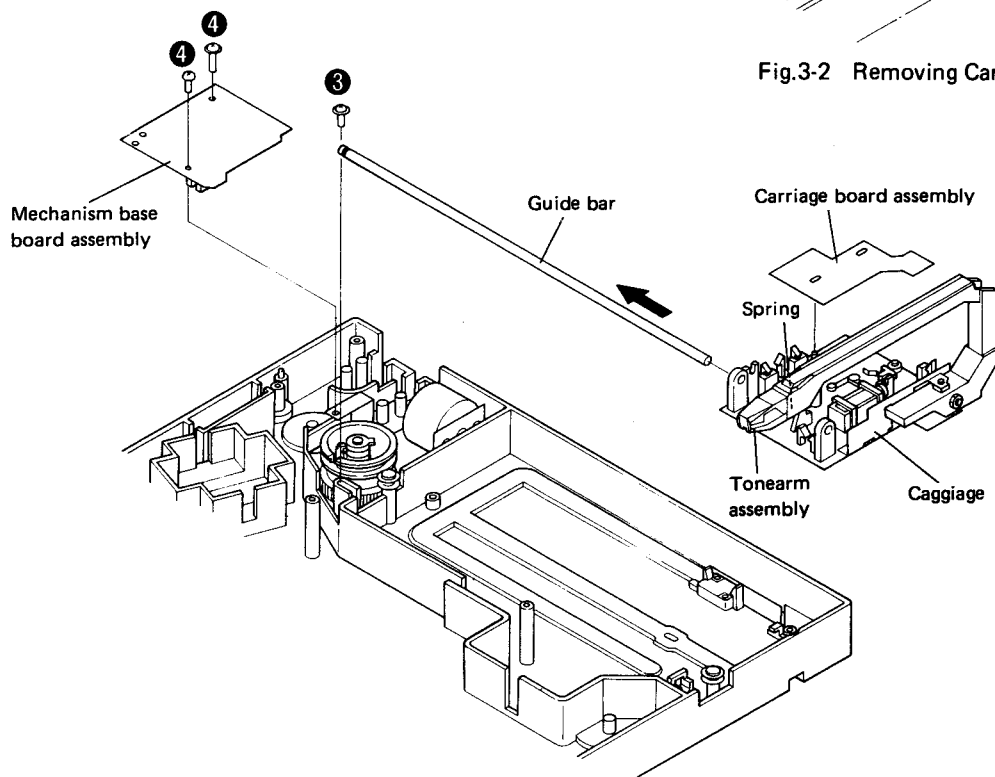


Fig.3-3 Carriage Removal

5.3 REPLACING THE CARRIAGE WIRE

- After assembling the carriage and tonearm assemblies in the opposite order of the previous section, replace the carriage wire according to the following steps.
1. Adjust the length of the wire unit as shown in figure 3-4 (a).
 2. Attach the wire unit grommet to the spring of the wormwheel as shown in figure 3-4 (b). Then wind the wire onto the worm wheel taking care not to let it get caught in the worm wheel groove. Also be careful not to let the wire overlap.
 3. Holding both the wire and the worm wheel, connect the wire to the wire guard and attach the worm wheel to the mechanism base.
 4. As shown in figure 3-4 (c), put the wire around the pulley, and push the fixer into the carriage until it locks with a click.

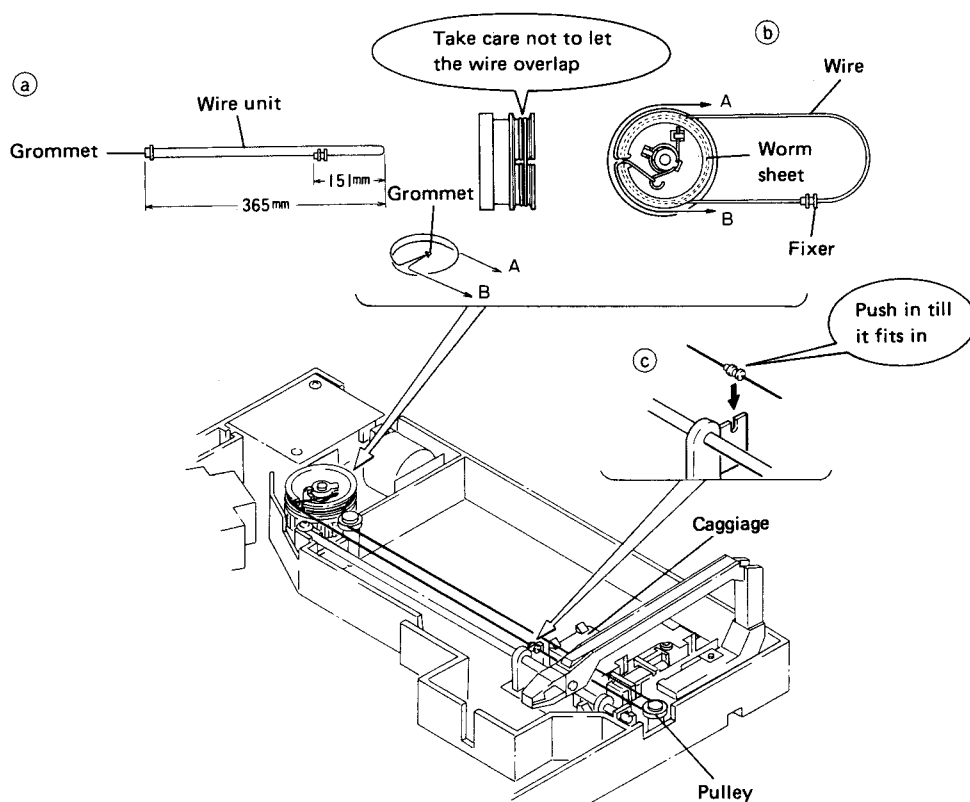


Fig. 3-4 Wire Replacement

3.4 LEAD LINE DISPOSAL

1. Move the carriage to the extreme right (rest position) and taking care not to stretch out the 4-lead line, attach the line to the hook, as shown in Fig. 3-5.
2. Move the carriage to the extreme left taking care not to stretch out the 2-lead line and 5-lead line, and then making sure that there is sufficient length of both lines pull the lines from the notch.
3. Manually move the carriage to the left and right, and make sure that the lead lines don't touch the carriage.

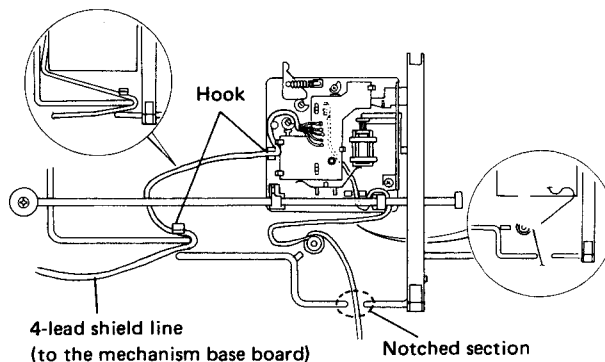



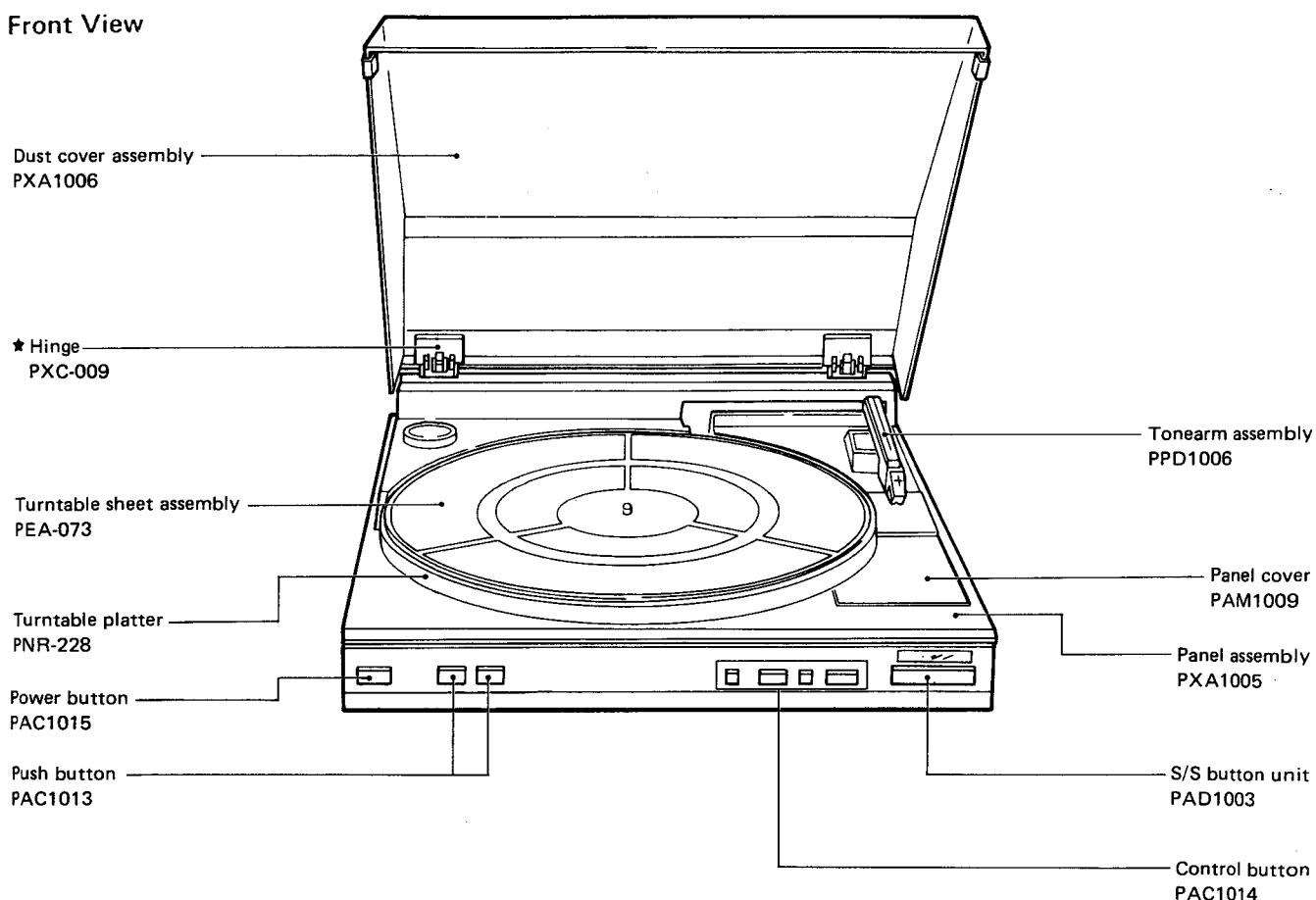
Fig. 3-5 Lead Line Disposal

4. PARTS LOCATIONS

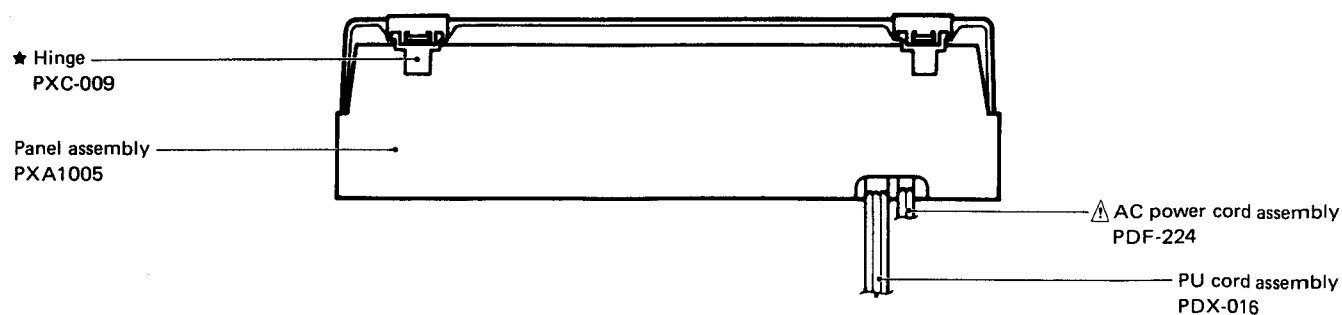
NOTES:

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.
- ★★ **GENERALLY MOVES FASTER THAN ★**
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- Parts marked by "●" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

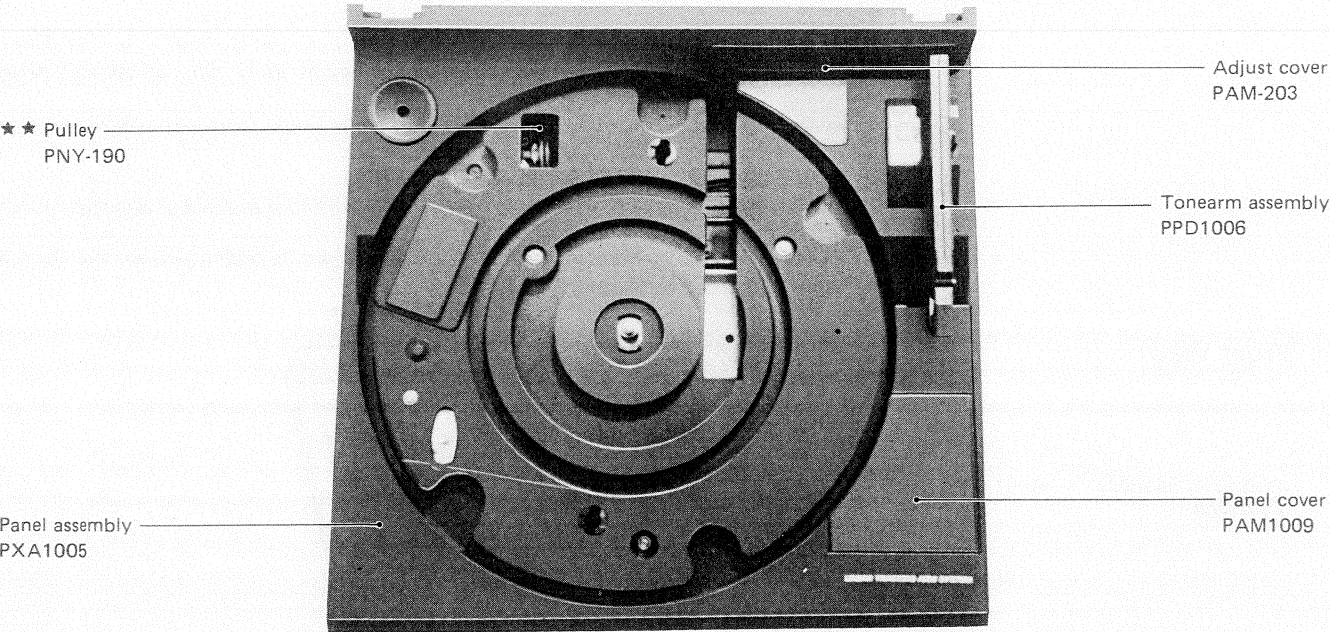
Front View



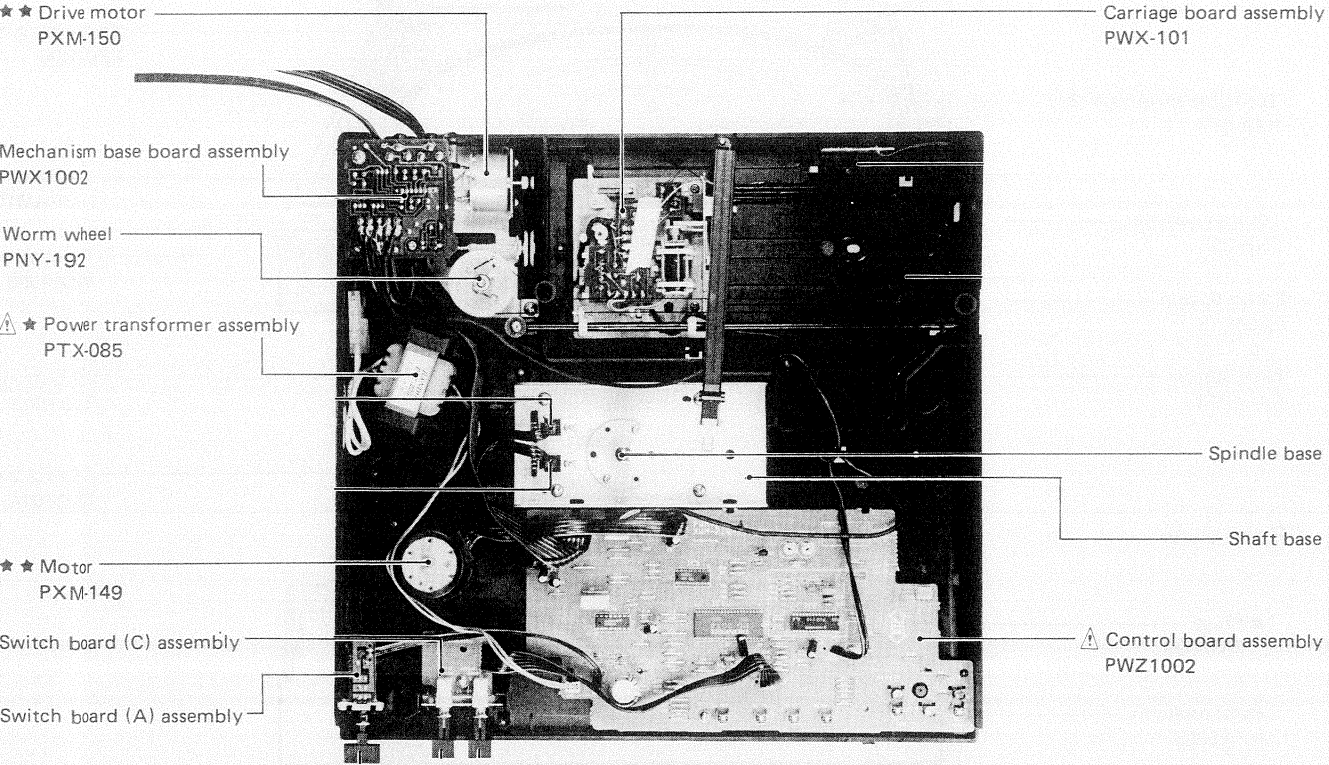
Rear View



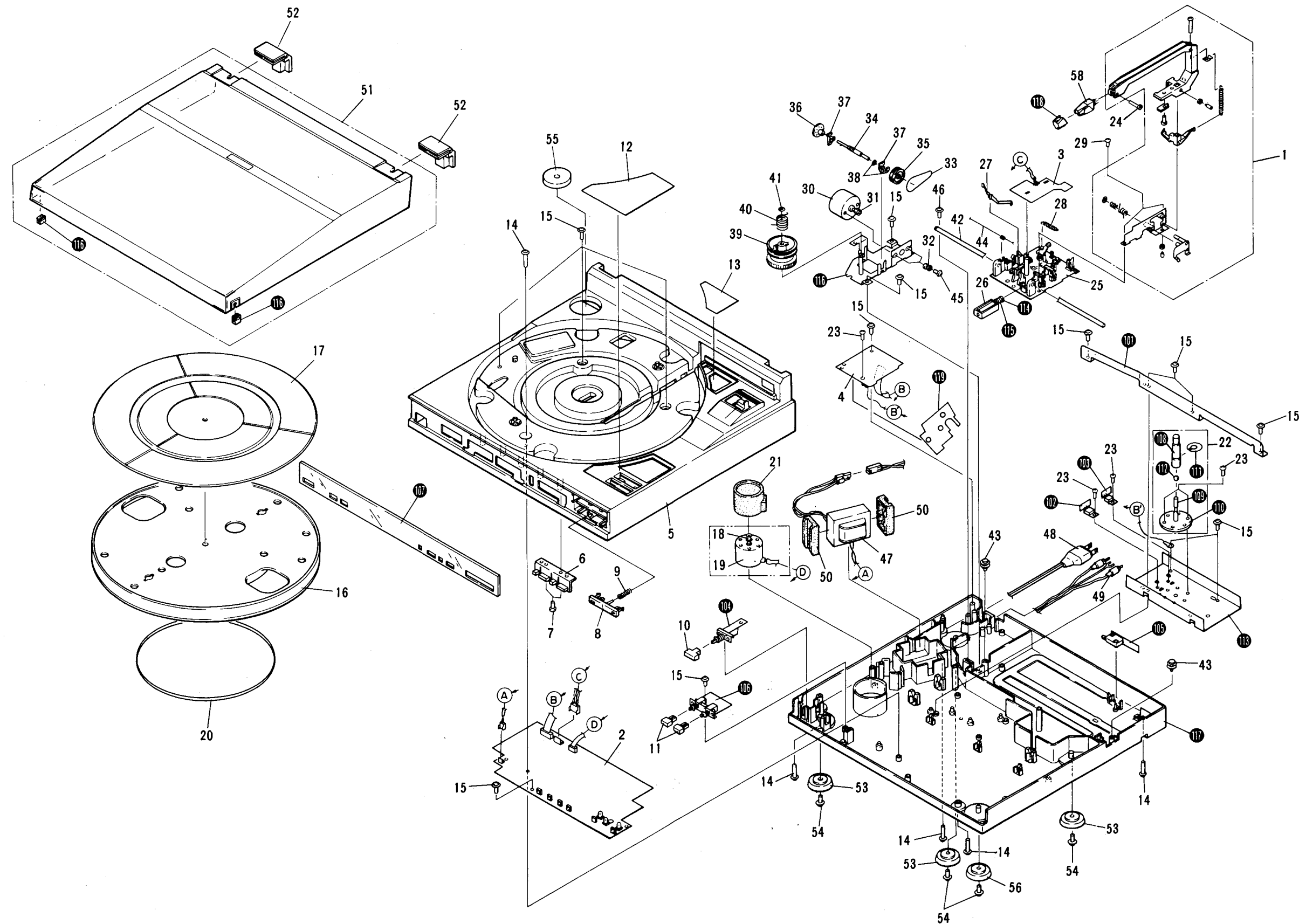
Top View



Bottom View



5. EXPLODED VIEW AND PARTS LIST



NOTES:

- Parts w
- The ⚠ factor of tion.
- For you and ★.
- ★★ GB This cl number
- Parts m than us

Parts List

Mark	M
★	

	1
	1
	1
	1
	1
	1
	1
	1
★★	1
★★	1
★★	2
	2
	2
	2
	2
	2
	2
	2
★★	3
★★	3
★★	3
★★	3
★★	3
	3
	3
	3
	4

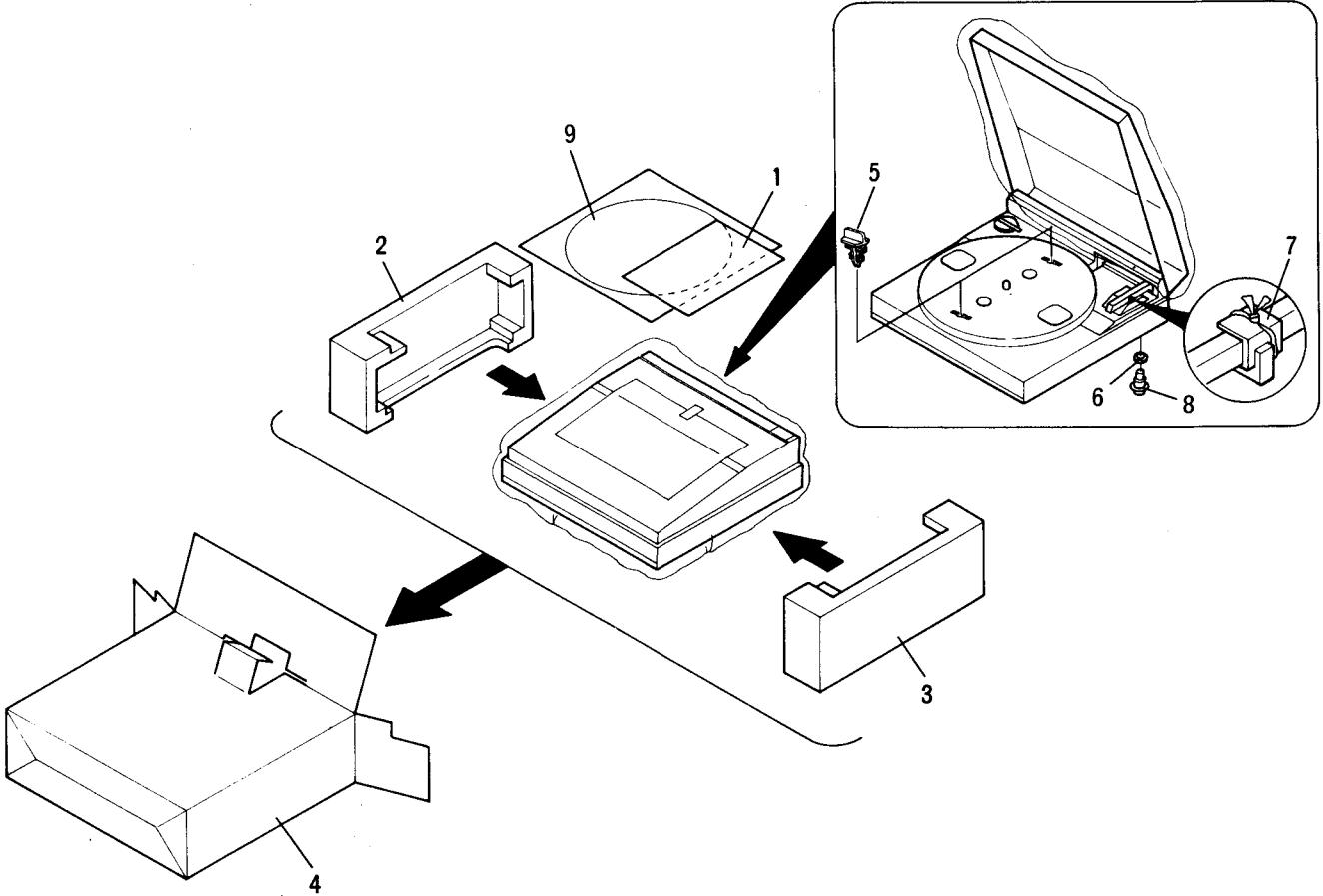
NOTES:

- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ **GENERALLY MOVES FASTER THAN ★**
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- Parts marked by "●" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

Parts List of Exploded View

Mark	No.	Part No.	Decription	Mark	No.	Part No.	Decription	
⚠	★	1.	PPD1006		41.	WT31D054D025	Washer	
		2.	PWZ1002		42.	PLB-280	Guide bar	
		3.	PWX-101		★★	43.	PXB-393	Pulley assembly
		4.	PWX1002			44.		Wire unit
		5.	PXA1005			45.	PBA-125	Screw
		6.	PAC1014		46.	PBA-159	Screw	
		7.	PPZ30P050FMC	⚠	★	47.	PTX-085	Power transformer assembly
		8.	PAD1003	⚠		48.	PDF-224	AC power cord assembly
		9.	PBH-433			49.	PDX-016	PU cord assembly
		10.	PAC1015			50.	PEB-279	Rubber
		11.	PAC1013			51.	PXA1006	Dust cover assembly
		12.	PAM1009		★	52.	PXC-009	Hinge
		13.				53.	PEB-331	Insulator
		14.	IPC30P290FMC			54.	PBA-159	Screw
		15.	IPC30P100FMC			55.	N93-603	45 adaptor
		16.	PNR-228			56.	PEB-330	Insulator
		17.	PEA-073			57.	IPC30P100FMC	Screw
★★		18.	PLB-114			58.	PXV-973	Cartridge (without stylus)
		19.	PXM-149			59.		
★★		20.	PEB-296			60.		
		21.	PEB-310			101.		Metal supporter
		22.	PXC-006			102.		IC board (A) assembly
		23.	PSZ40P060FMC			103.		IC board (B) assembly
		24.	PBA-170			104.		Switch board (A) assembly
		25.	PNY-564			105.		Switch board (B) assembly
		26.	PXB-392			106.		Switch board (C) assembly
		27.	PBK-103			107.		Name plate
		28.	PBH-434			108.		Shaft metal
		29.	PSZ30P050FMC			109.		Spindle
★★		30.	PXM-150			110.		Spindle base
★★		31.	PNX-498			111.		Washer
		32.	PEB-184			112.		Steel ball φ4 SLIJ
★★		33.	PEB-097			113.		Shaft base
		34.	PNW-485			114.		Solenoid cap
★★		35.	PNY-190			115.		UP spring
		36.	PNY-191			116.		Mechanism base unit
		37.	PNW-391			117.		Under base
		38.	WA21D040D025			118.		Stylus
		39.	PNY-192			119.		Shield plate
		40.	PBH-391					

6. PACKING



Parts List of Packing

Mark	No.	Part No.	Description
	1.	PRE1002	Operating instructions
	2.	PHA-200	Protector (L)
	3.	PHA-201	Protector (R)
	4.	PHG1010	Packing case
	5.	PNY-479	Clamper
	6.	WC40FMC	Washer
	7.	Z23-001	Mirror mat sheet
	8.	PBA-186	Screw
	9.	PEA-073	Turntable sheet assembly

7. P. C. BOARDS CONNECTION DIAGRAM

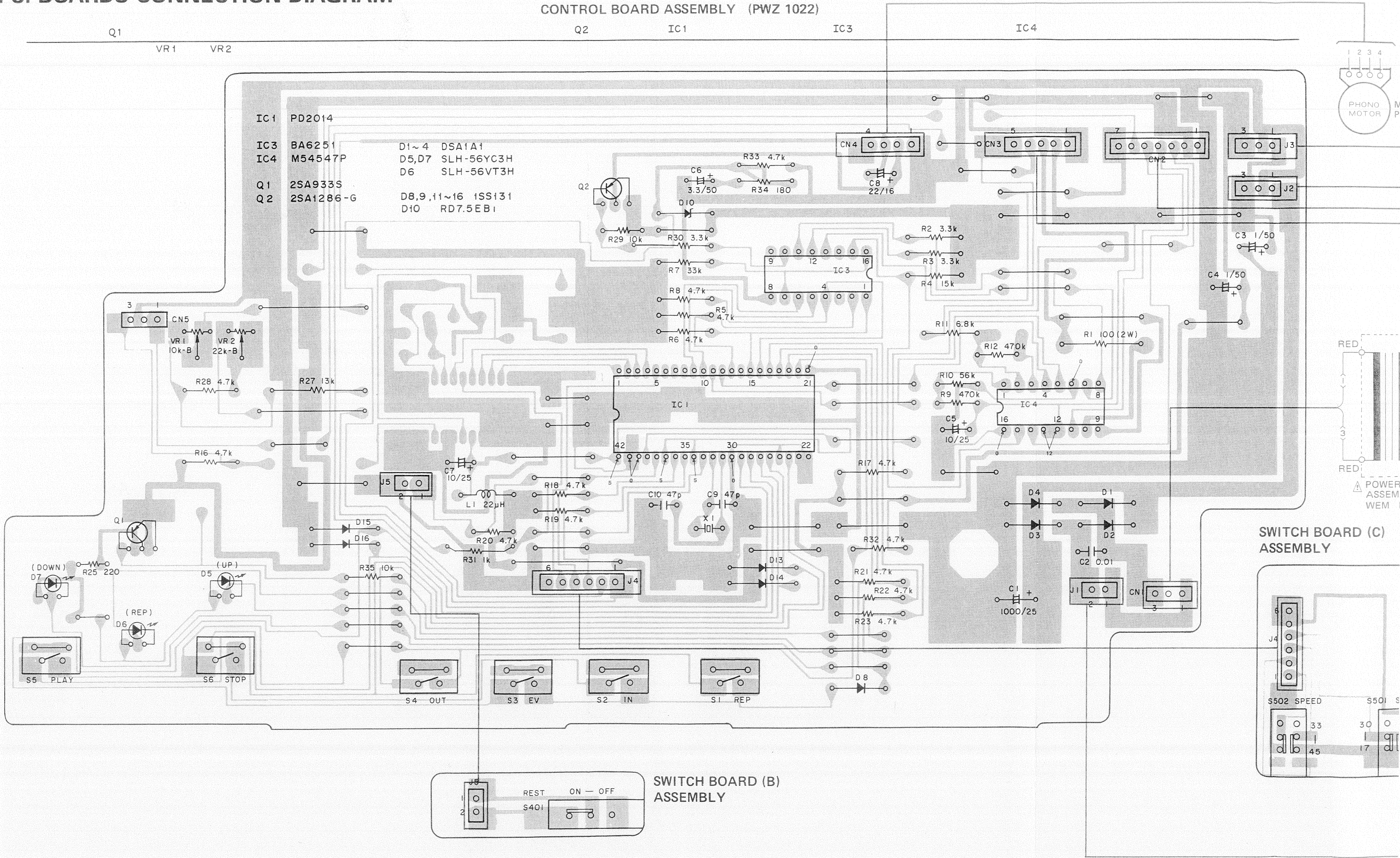
CONTROL BOARD ASSEMBLY (PWZ 1022)

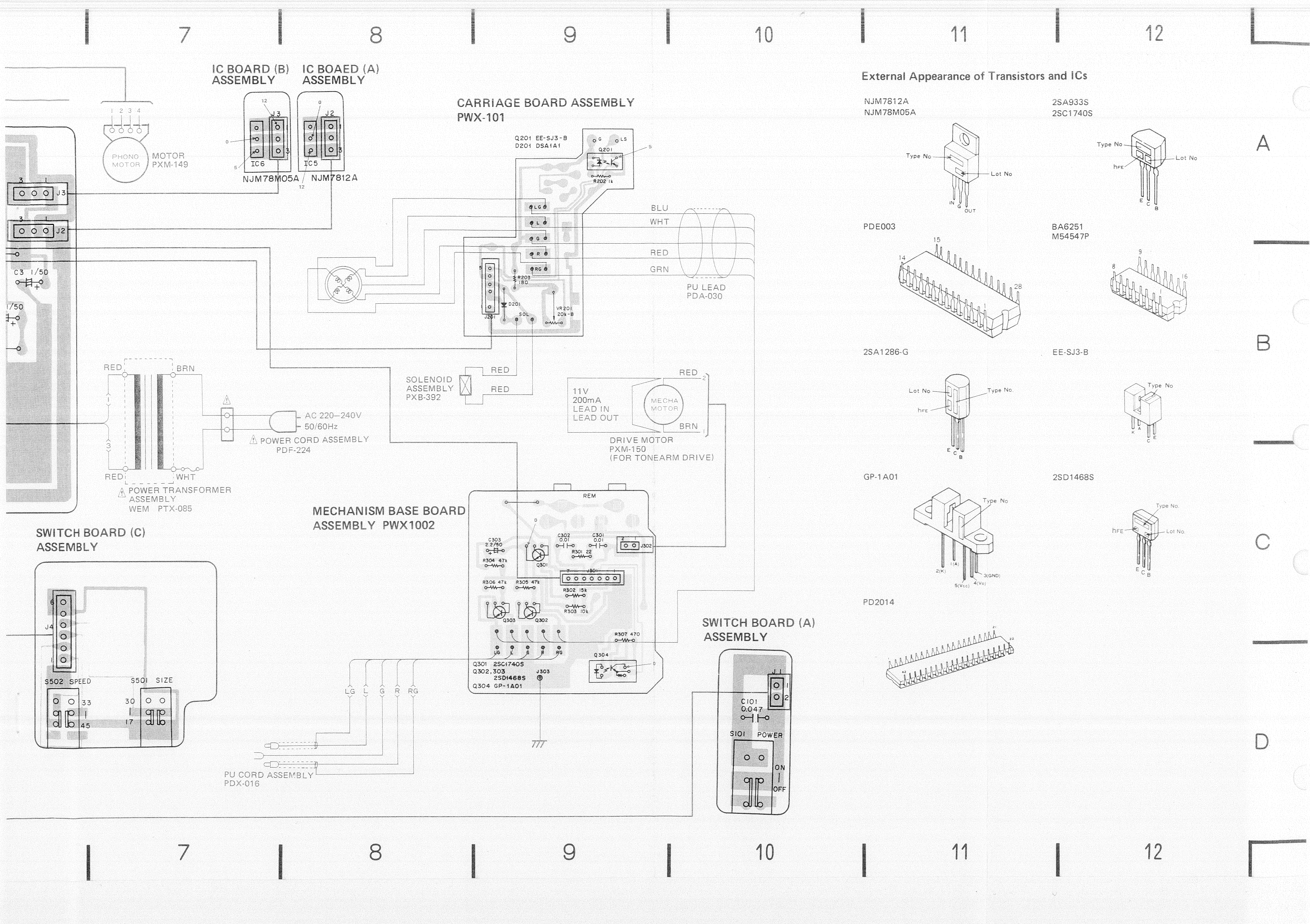
A

B

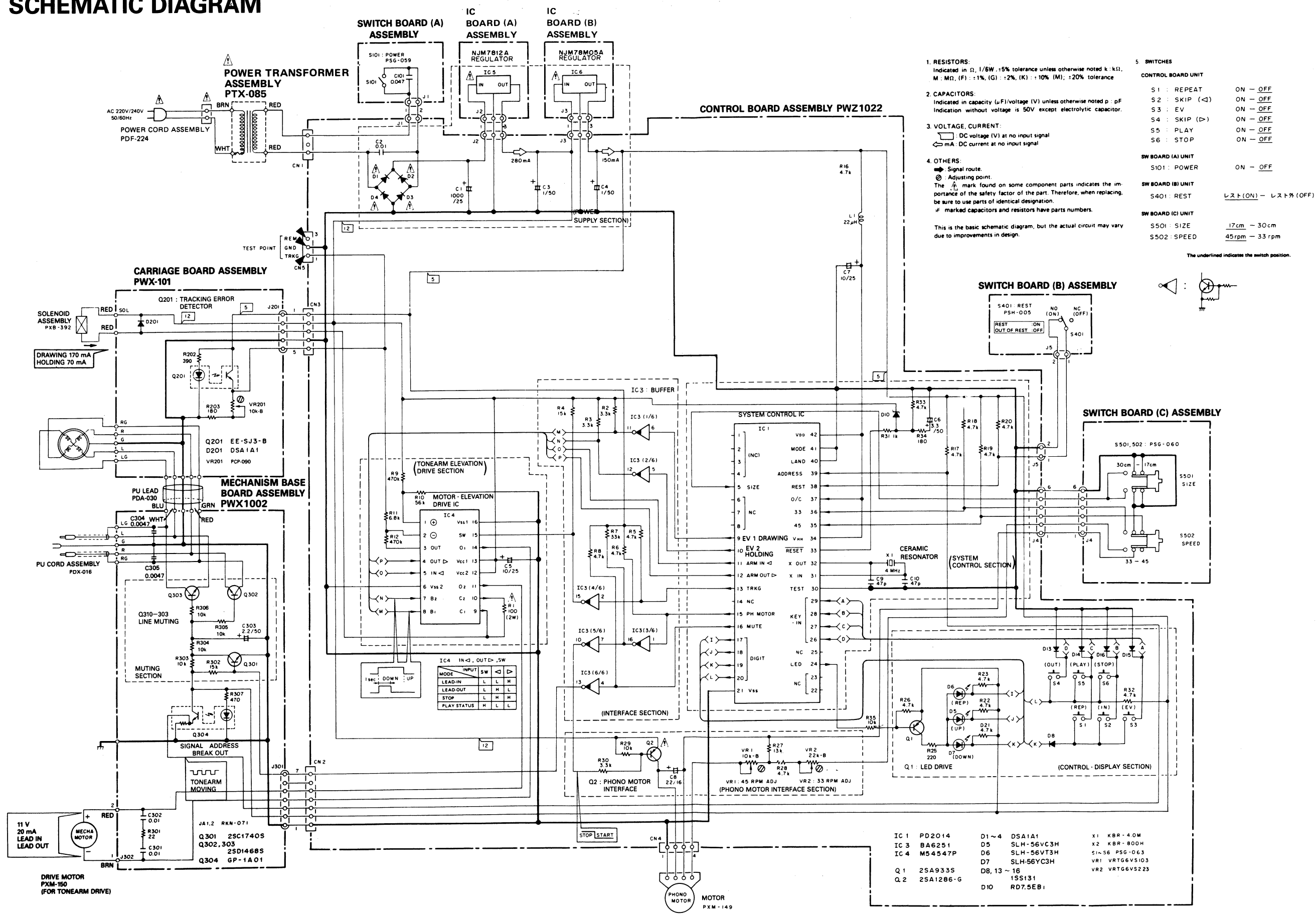
C

D





8. SCHEMATIC DIAGRAM



9. ELECTRICAL PARTS LIST

NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.
Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).
560Ω 56 × 10¹ 561.....RD1/4PS 5 6 1 J
47kΩ 47 × 10³ 473.....RD1/4PS 4 7 3 J
0.5Ω 0R5.....RN2H 0 5 K
1Ω 010.....RS1P 0 1 0 K
- Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).
5.62kΩ 562 × 10¹ 5621.....RN1/4SR 5 6 2 1 F
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
★★ GENERALLY MOVES FASTER THAN ★
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- Parts marked by “●” are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

Miscellaneous Parts

Mark	Symbol & Description	Part No.
⚠	Control board assembly	PWZ1022
	IC board (A) assembly	Non supply
	IC board (B) assembly	Non supply
	SW board (A) assembly	Non supply
	SW board (B) assembly	Non supply
	SW board (C) assembly	Non supply
	Carriage board assembly	PWX-101
	Mechanism base board assembly	PWX1002
	AC power cord	PDG-037
★★	Drive motor	PXM-150
★★	Phono motor	PXM-149
	Solenoid assembly	PXM-392
	PU cord assembly	PDX-016

Contorl Board Assembly (PWZ1022)

SEMICONDUCTORS		
Mark	Symbol & Description	Part No.
★★	IC3 TR-Array	BA6251
★★	IC4 Motor driver	M54547P
★★	IC1 IC	PD2014
⚠	★★ Q2	2SA1286
⚠	★★ Q1	2SA933S
⚠	★ D1 – D4	DSA1A1 (DSA1A2)
	D10	RD7.5EB1/EB2
	D7 LED	SLH-56YC3H
	D6 LED	SLH-56VT3H
	D5 LED	SLH-56YC3H
	D8, D13 – D16	1SS131
SWITCHES		
Mark	Symbol & Description	Part No.
★★	S1 – S6 Tact switch	PSG-063
COIL		
Mark	Symbol & Description	Part No.
	L1 Axial coil	LAL03T220K
CAPACITORS		
Mark	Symbol & Description	Part No.
	C9, C10	CCDSL470J50
	C3, C4	CEA1R0M50
	C5, C7	CEA100M25
	C8	CEA220M16
	C6	CEA3RM50
	C2	CKDYF103Z50
	C1	PCL-069

RESISTORS

Mark	Symbol & Description	Part No.
★	VR2 Semi-fixed (22kΩ)	VRTG6VS223
★	VR1 Semi-fixed (10kΩ)	VRTG6VS103
⚠	R1 Metal Oxide	RS2LMF101J
	Other resistors	RD1/6PM□□□J

OTHER

Mark	Symbol & Description	Part No.
	X1 Ceramic resonator	KBR-4.0M

IC Board (A) Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠	★★ IC5 Regurator IC	NJM7812A

IC Board (B) Assembly

SEMIDONCUCTOR

Mark	Symbol & Description	Part No.
⚠	★★ IC6 Regurator IC	NJM78M05A

SW Board (A) Assembly

SWITCH

Mark	Symbol & Description	Part No.
⚠	★★ S101 Push switch	PSG-059

CAPACITOR

Mark	Symbol & Description	Part No.
	C101	CKDYF473Z50

SW Board (B) Assembly

SWITCH

Mark	Symbol & Description	Part No.
★★	S401 Slide switch (REST SW)	PSH-005

SW Board (C) Assembly

SWITCH

Mark	Symbol & Description	Part No.
★★	S501, S502 Push switch (SIZE, SPEED)	PSG-060

Mechanism Base Board Assembly (PWX1002)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q304	GP-1A01
★★	Q301	2SC1740S
★★	Q302, Q303	2SD1468S

CAPACITORS

Mark	Symbol & Description	Part No.
	C303	CEA2R2M50
	C301, C302	CKDYF103Z50
	C304, C305	CKSYF472Z50

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	J11, JA2 Jack (REM)	RKN-071

Carriage Board Assebmly (PWX-101)

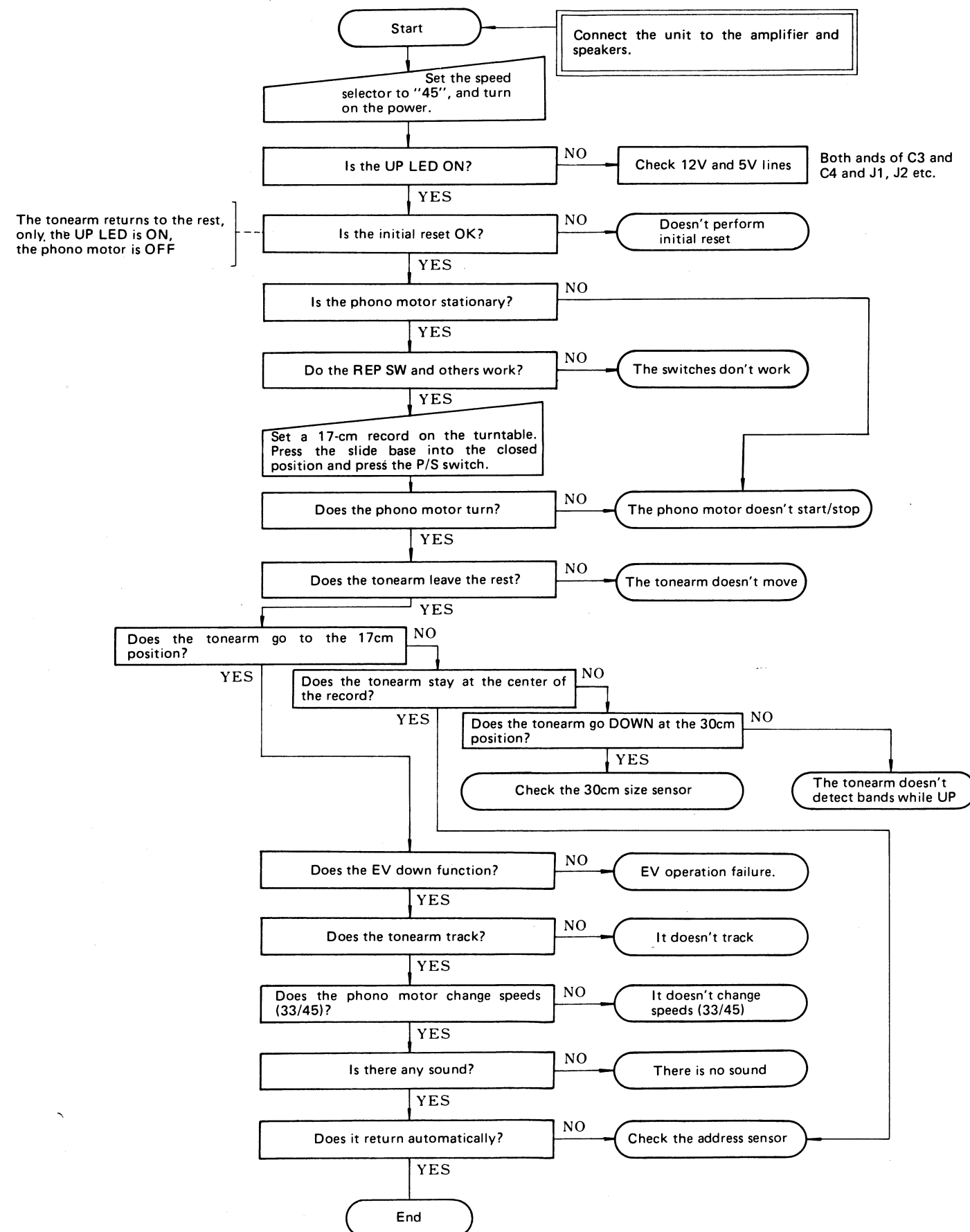
SEMICONDUCTORS

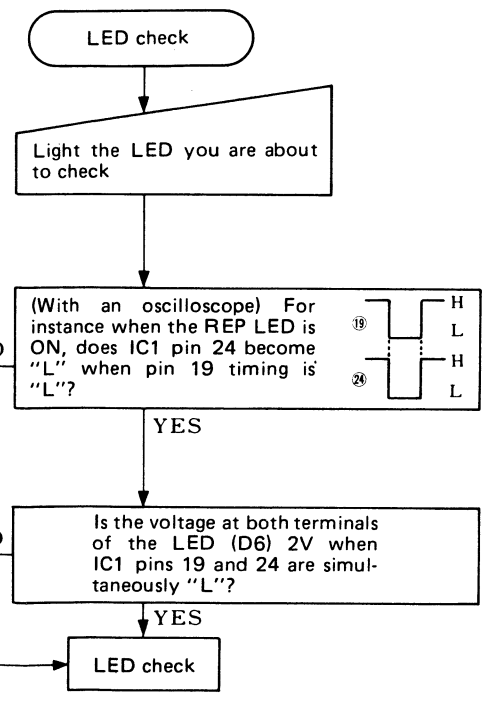
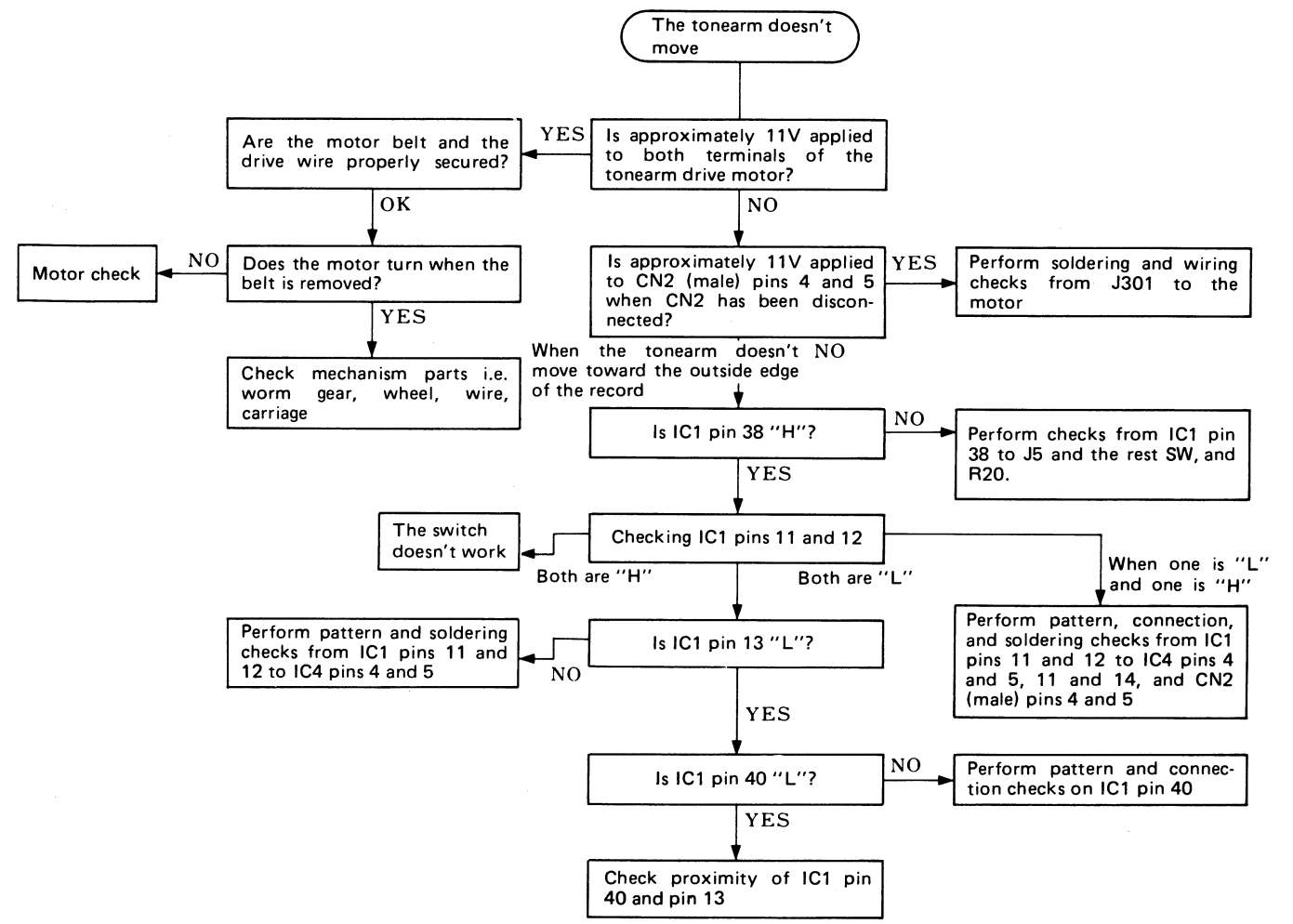
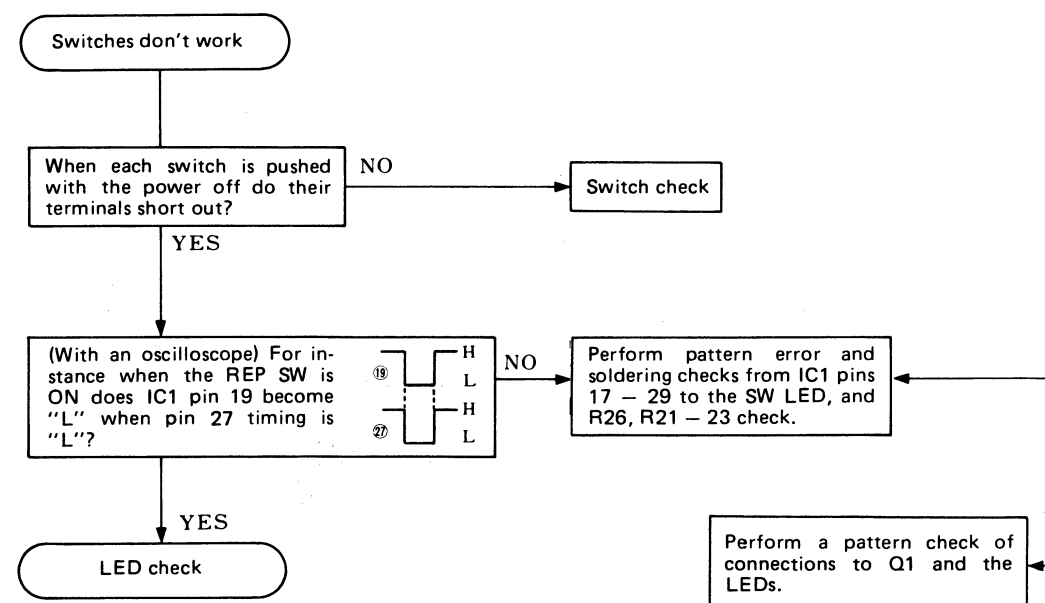
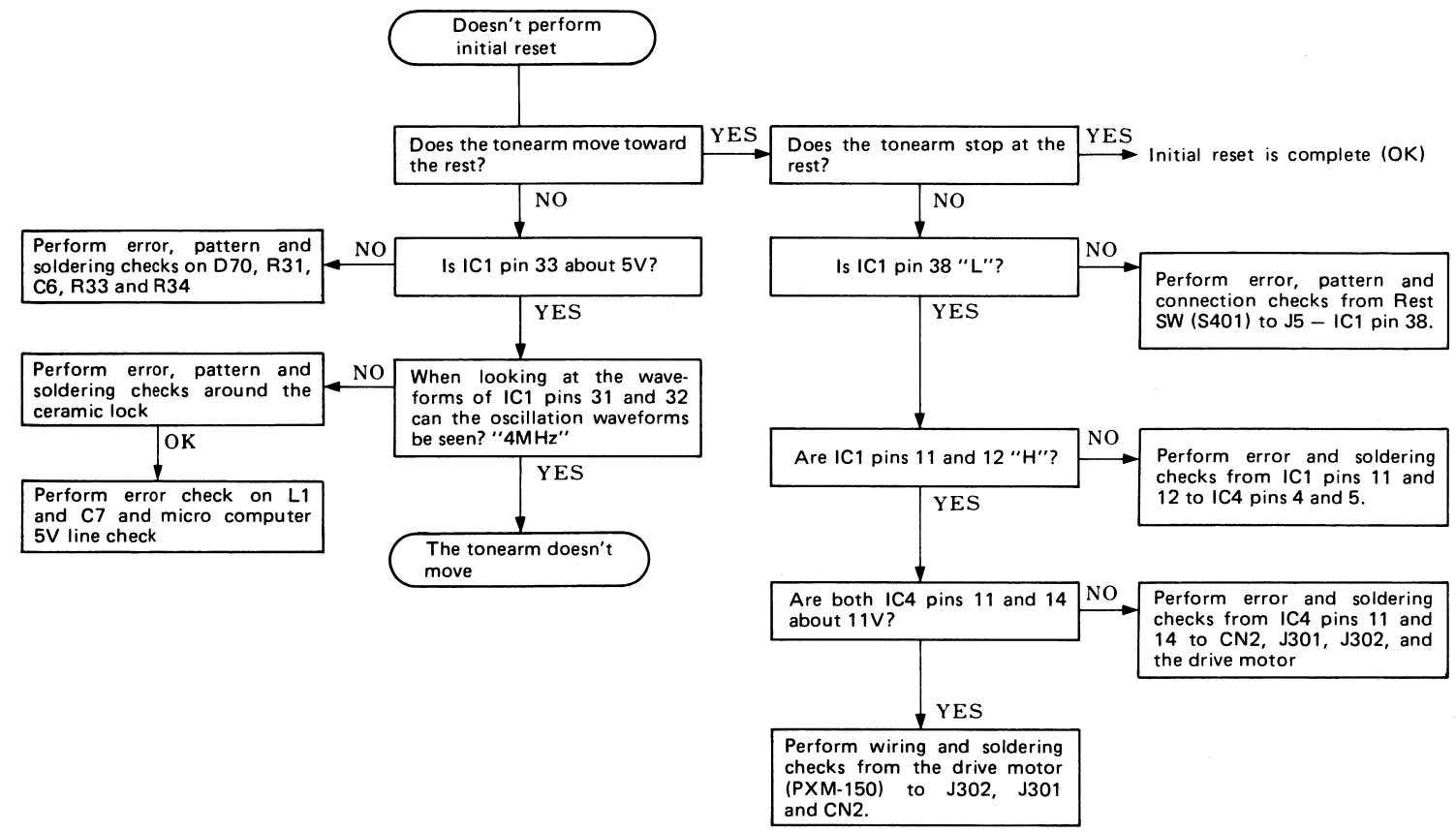
Mark	Symbol & Description	Part No.
★★	Q201	EE-SJ3-B
★	D201	DSA1A1 (1SR35-100A)

RESISTORS

Mark	Symbol & Description	Part No.
★	VR201 Semi-fixed 20kΩ-B	PCP-083
	Other resistors	RD1/6PM□□□J

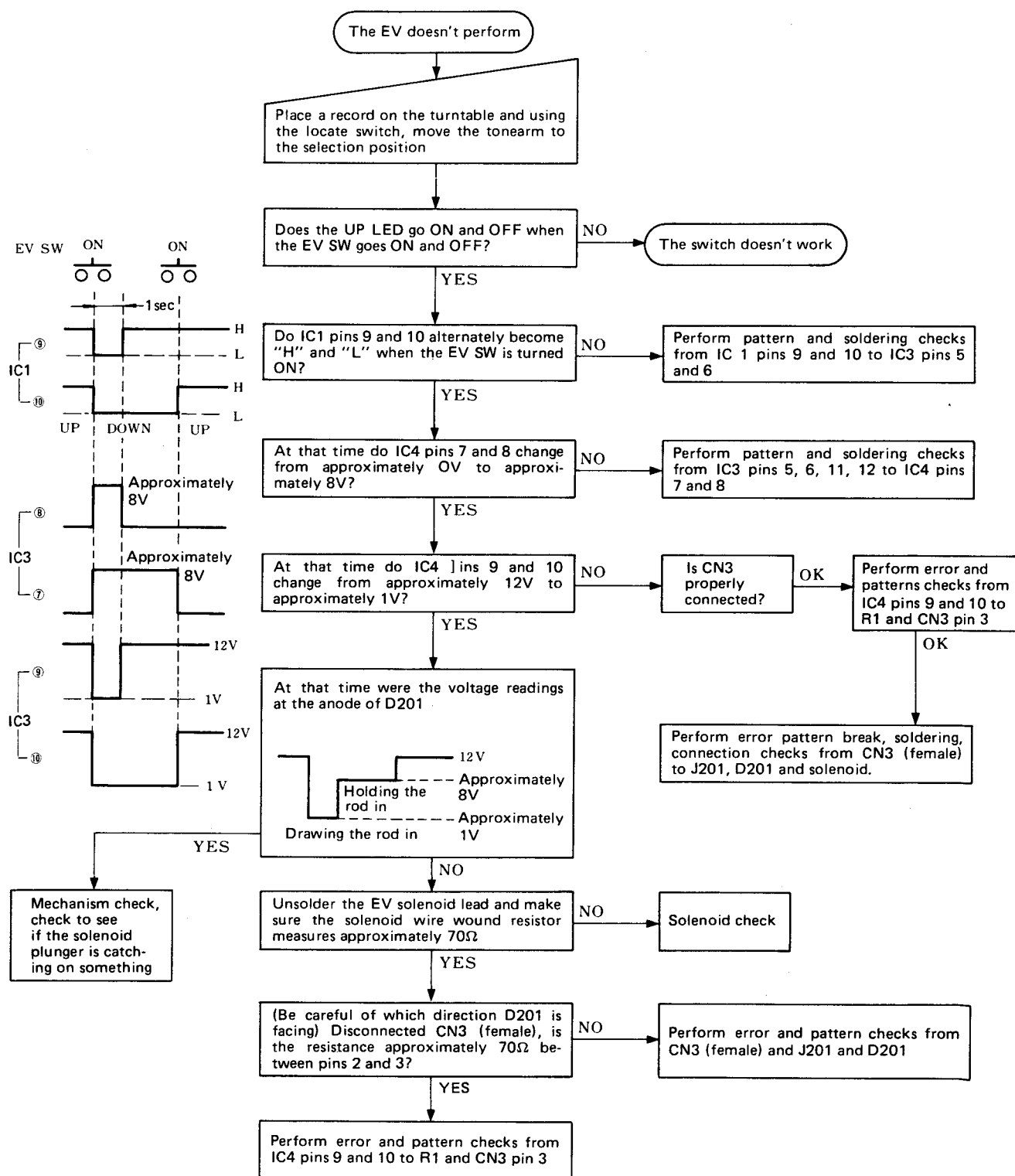
10. TROUBLESHOOTING

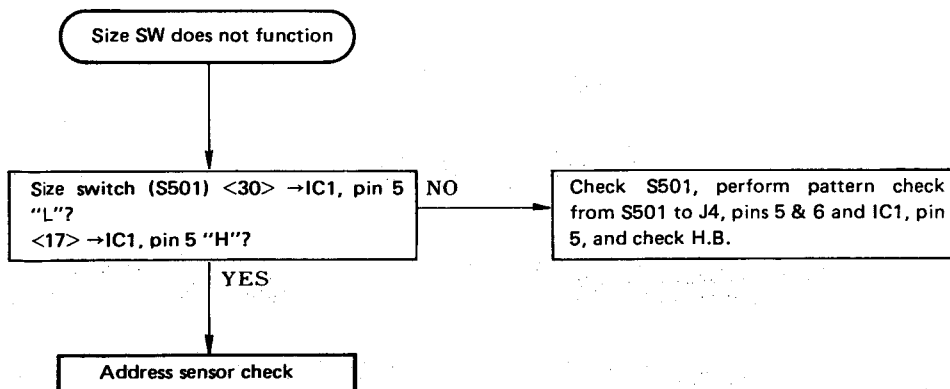
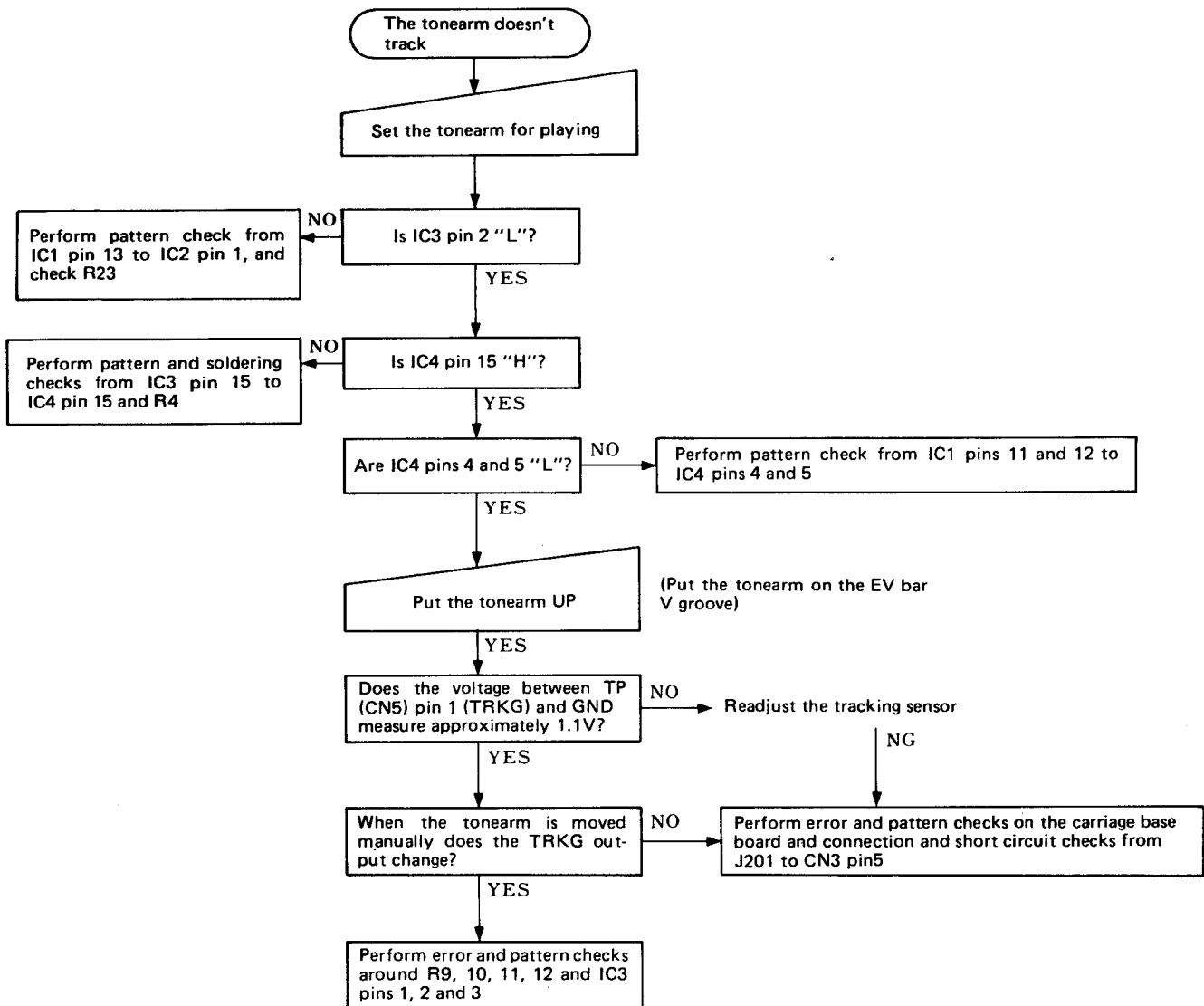


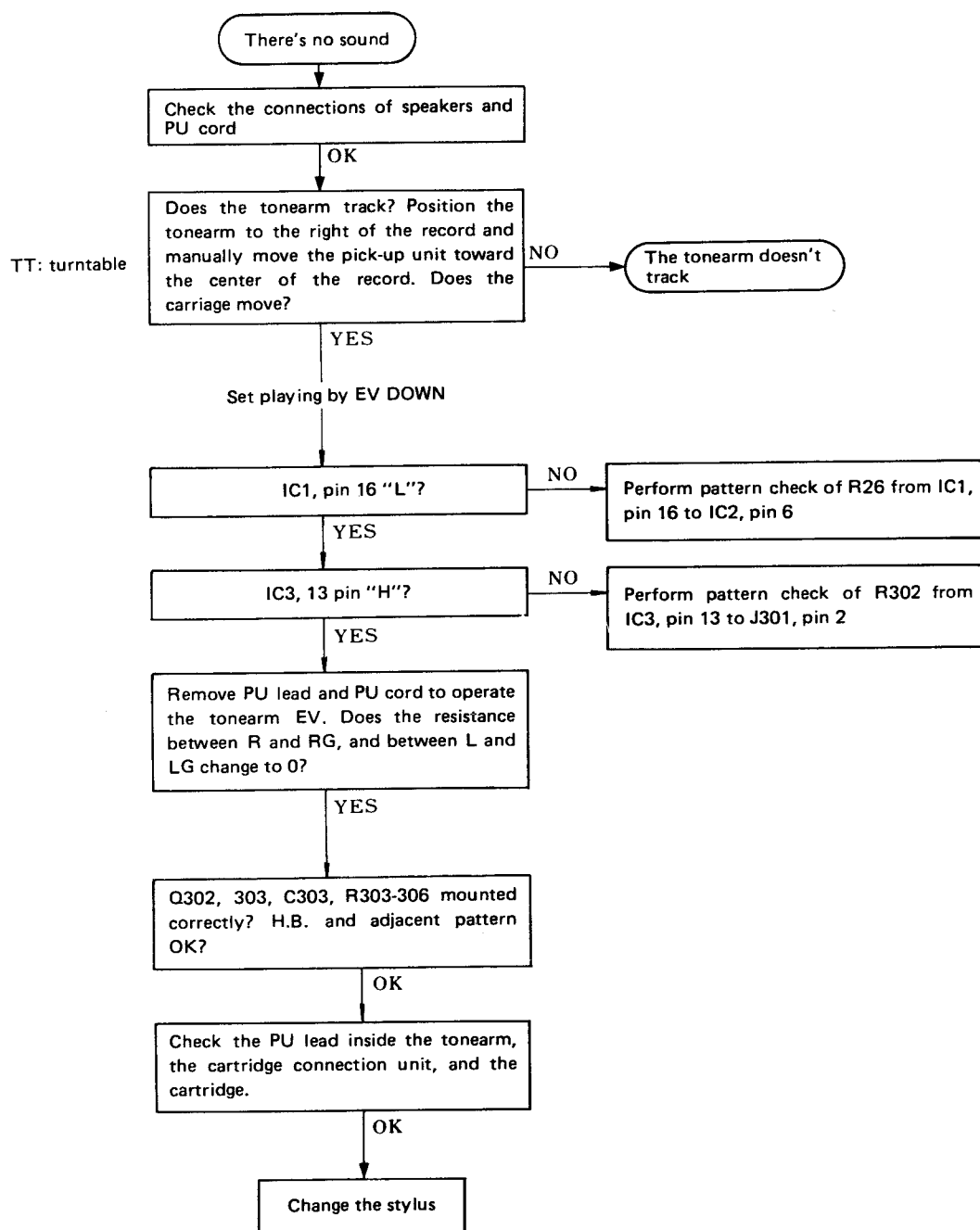


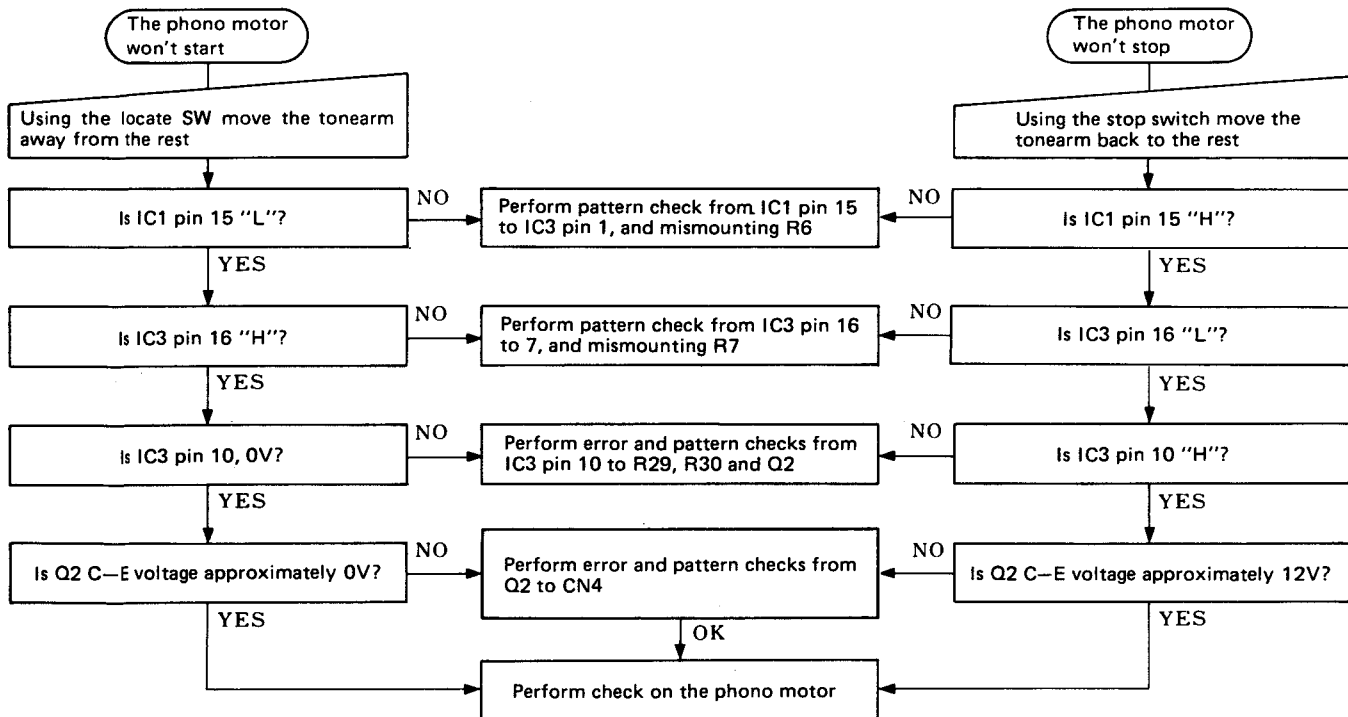
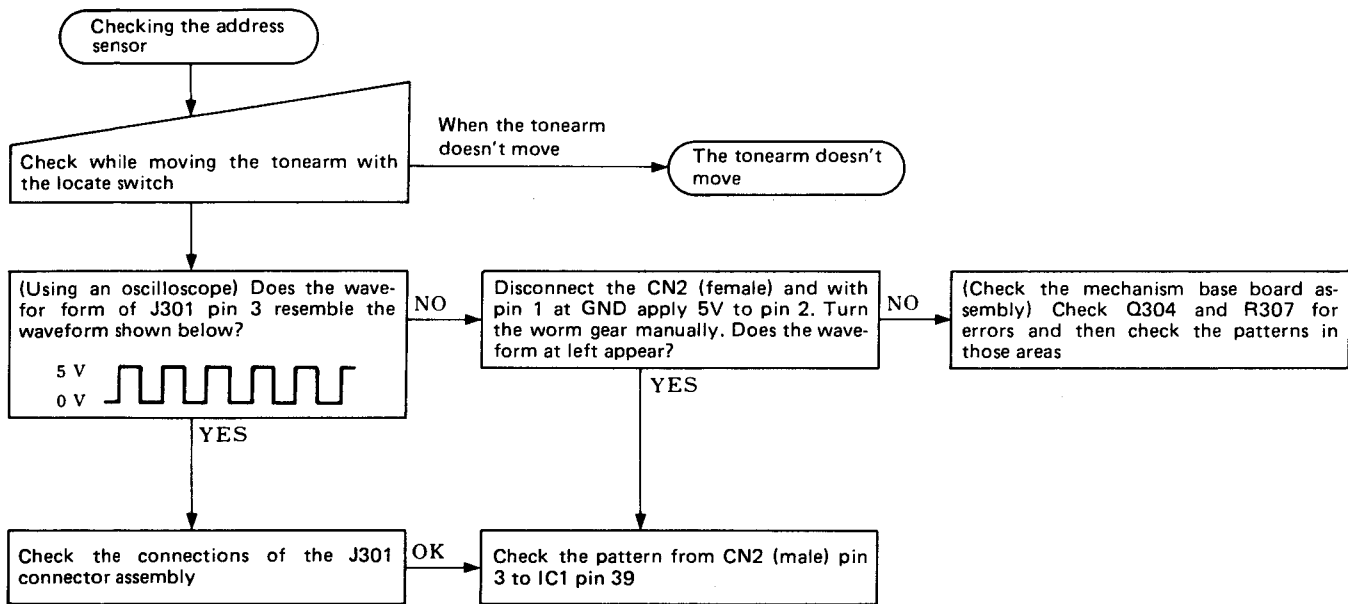
Note:

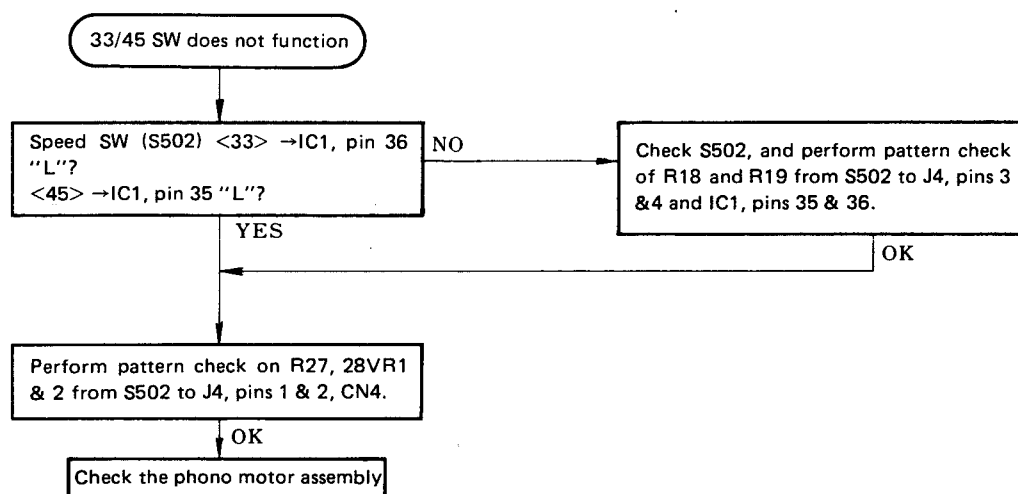
- The EV is up while the tonearm is on the arm rest, and will not go down in that state.











11. ADJUSTMENTS

The following panel removal procedure is required for all adjustments except speed adjustment.

- **Panel Removal (Required before adjustments can be made)**

1. Position the tonearm at the lead-in groove of a record.
2. Remove the platter.
3. Either manually or using the Arm Locate switch (▶▶), position the tonearm just above the section notched for panel removal (see Fig. 11-1).
4. After removing the 8 securing screws (1), lift up the rear section of the panel assembly, remove the tonearm assembly from the notched section and remove the panel assembly by lifting it up and pulling forward.
5. Reposition the tonearm and replace the platter.

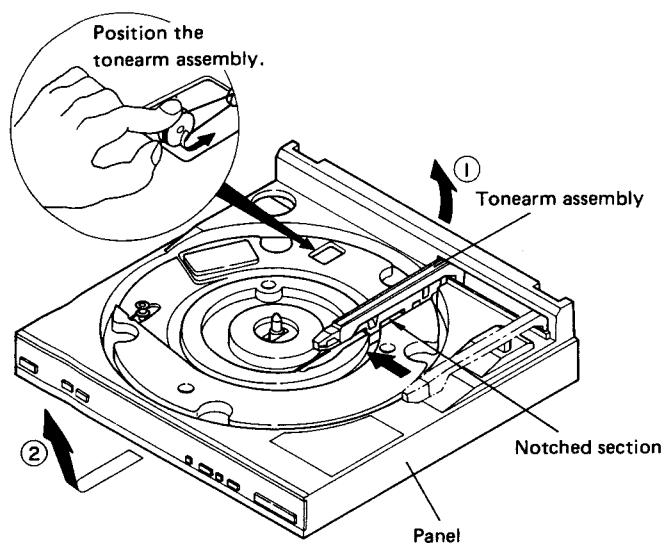


Fig. 11-1 Panel Removal

11.1 STYLUS LOWERING POSITION ADJUSTMENT

1. With the power ON place a test record PLS-4001S side A up) on the turntable.
 2. Press the START/STOP key and check the position of the tonearm as it comes to rest on the record.
 3. Turn the adjustment screw ① until the tonearm comes into line with the record.
- When the tonearm comes to rest to the right of the lead-in groove, (when the count is lower than the standard count tolerance) turn the adjustment screw ① counter-clockwise.
 - When the tonearm comes to rest to the left of the lead-in groove, (when the count is higher than the standard count tolerance) turn the adjustment screw ① clock-wise.
 - When using the test record the position will be set for 30cm records.

Test record	Adjustment position
PLS4001S	13 ± 6 counts

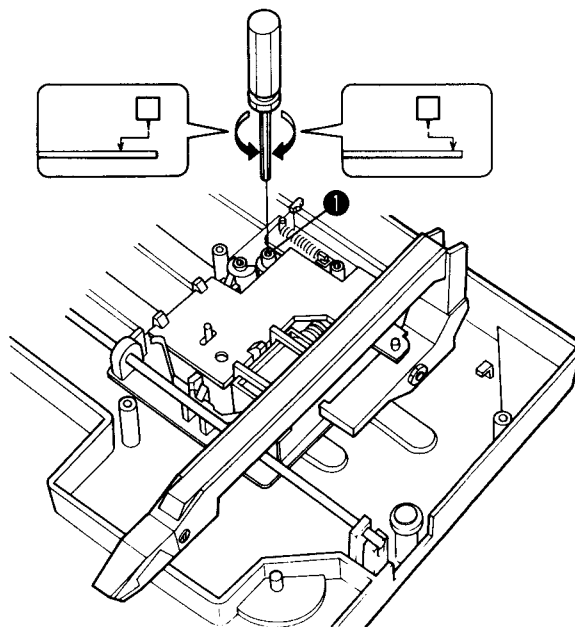


Fig. 11-2 Stylus Lowering Position Adjustment

11.2 TRACKING SENSOR AND OFFSET ADJUSTMENT

1. Remove the Dust cover assembly and turntable platter.
2. Connect a DC voltmeter to CN5 pin ② (GND) and pin 1 (TRKG).
3. Turn screw ② counterclockwise and pull the carriage unit forward.
4. Turn on the power and while pushing the tone arm toward the center (as shown in the illustration) adjust VR201 (TRKG) until the DC voltmeter registers $3V \pm 0.1V$.

● Offset Adjustment

5. Return the tonearm to the rest position. (It will return by itself when you release it.)
6. To adjust it, turn screw ② clockwise until the DC voltmeter registers $1.0V \pm 0.1V$.

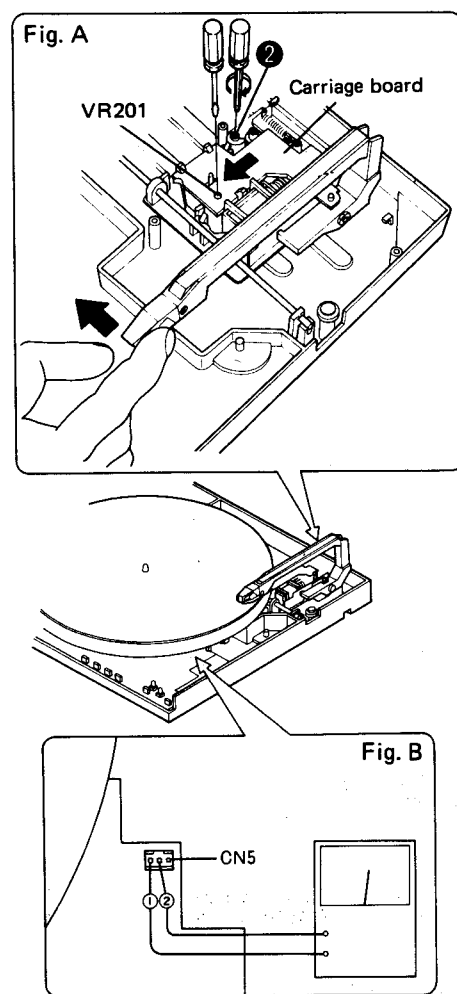


Fig. 11-3 Band Sensor Offset Adjustment

11.3 STYLUS HEIGHT ADJUSTMENT

1. Place a 30cm record on the turntable, turn on the power, and using the locate switch (◀▶) move the tonearm to within approximately 100mm of the center of the turntable.
2. Turn screw ③ until the tip of the needle is 5 to 7mm above the surface of the record.
 - Turning the screw clockwise lowers the needle.
 - Turning the screw counterclockwise raises the needle.

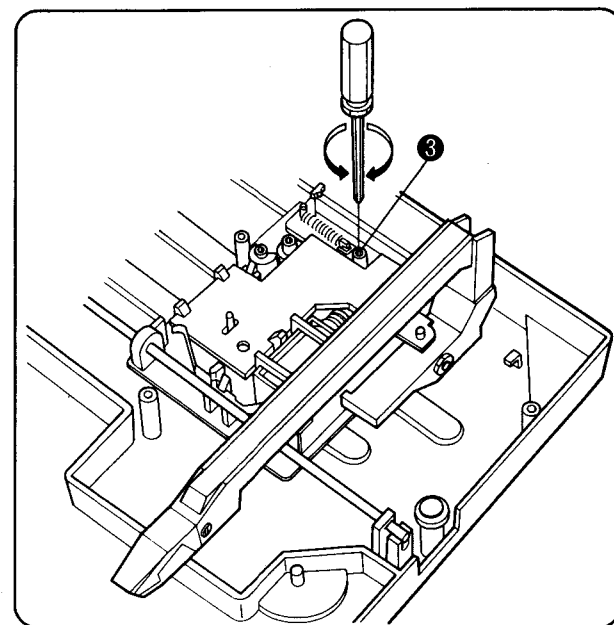
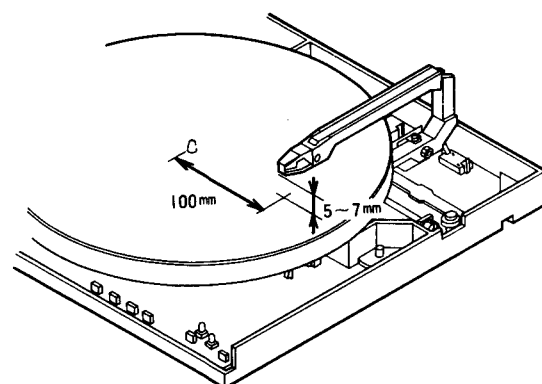


Fig. 11-4 Stylus Height Adjustment

11.4 PHONO MOTOR SPEED ADJUSTMENT

1. Turn the power on with a stroboscope connected to the turntable, and turn on the Locate switch to engage the phono motor.
2. Insert a small screwdriver from beneath the panel through the speed adjustment hole to adjust the 45 rpm setting (VR4) or the 33-1/3 rpm setting (VR5).

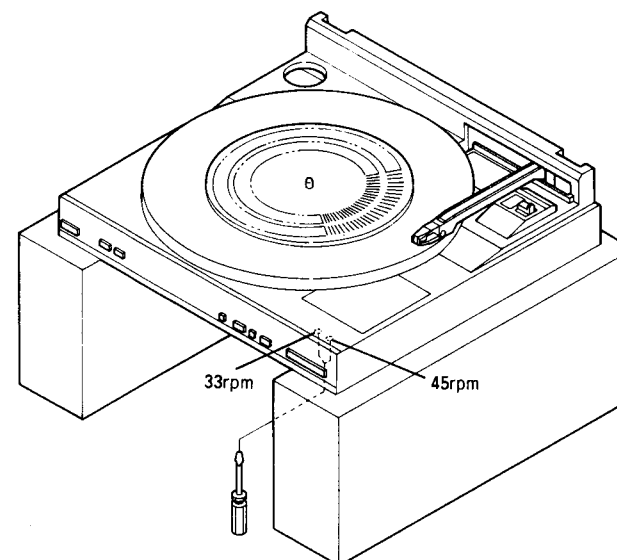


Fig. 11-5 Phono Motor Speed Adjustment

11. RÉGLAGE

La procédure de dépose de panneau suivante s'applique à tous les réglages sauf pour le réglage de vitesse.

• Dépose de Panneau (nécessaire avant d'effectuer les rés réglages)

- 1. Positionner le bras de lecture sur le sillon initial du disque.
- 2. Déposer le plateau.
- 3. Placer le bras de lecture juste au-dessus de la section à rainure pour la dépose du panneau, soit manuellement, soit en utilisant le commutateur de positionnement du bras (▶▶) (se référer à la figure 11-1).
- 4. Après avoir déposé les 8 vis de fixation ❶, soulever la section arrière de l'ensemble du panneau, déposer l'ensemble du bras de lecture de la section à rainure, puis l'ensemble du panneau en le soulevant vers le haut et en le tirant en avant.
- 5. Positionner de nouveau le bras de lecture et remettre le plateau en position.

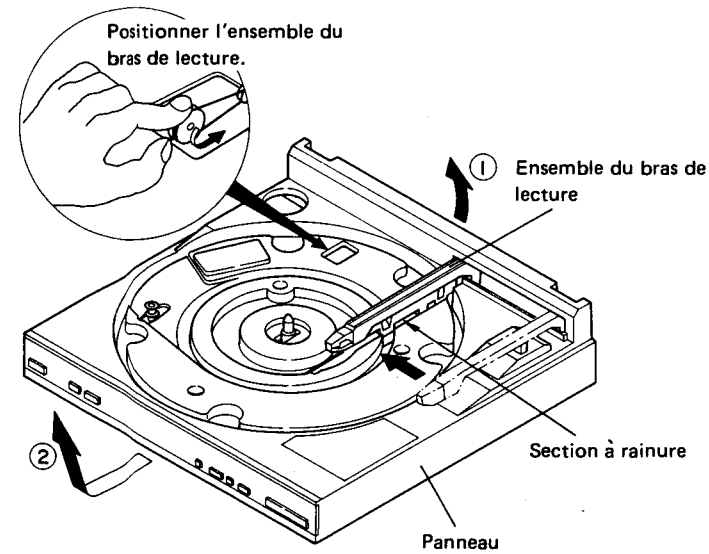


Fig. 11-1 Dépose de panneau

11.1 RÉGLAGE DU BRAS DE PICK-UP

- 1. En mettant l'appareil sous tension, placer un disque d'essai (PLS-4001S, avec le côté A vers le haut) sur la platine de lecture de disques.
- 2. Presser le bouton de reproduction/arrêt (PLAY/STOP) et vérifier la position du bras de pick-up au moment où il se pose sur le disque.
- 3. Tourner la vis ❶ de réglage jusqu'à ce que le bras de pick-up soit aligné avec le disque.
- Lorsque le bras de pick-up se pose sur la droite du sillon initial, (au cas où le compte est inférieur à la tolérance normale de compte) tourner la vis ❶ de réglage dans le sens contraire des aiguilles d'une montre.
- Lorsque le bras de pick-up se pose sur la gauche du sillon initial, (au cas où le compte est supérieur à la tolérance normale de compte) tourner la vis ❶ de réglage dans le sens des aiguilles d'une montre.
- Lorsque l'on utilise le disque d'essai, la position sera réglée pour les disques de 30 cm.

Disque d'essai	Position de réglage
PLS4001S	13 ± 6 comptes

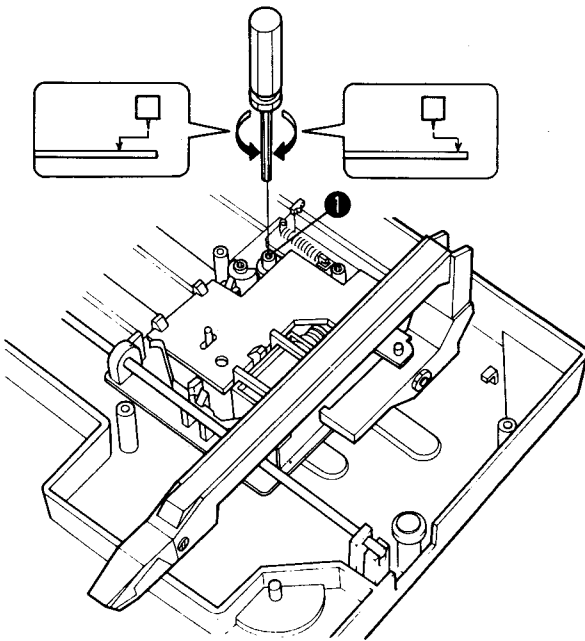


Fig. 11-2 Réglage du point de chute de la point de lecture

11.2 RÉGLAGE DU GAIN DU SENSEUR D'ALIGNEMENT ET DU DECENTRAGE

• Réglage du Gain

- 1. Déposer le couvercle anti-poussière et le plateau.
- 2. Connecter un voltmètre CC à la broche No. 2 (GND) et à la broche No. 1 (TRKG) de CN5.
- 3. Tourner la vis ❷ dans le sens contraire des aiguilles d'une montre et tirer le bloc du chariot en avant.
- 4. Mettre l'appareil sous tension et tout en poussant le bras de pick-up vers le centre (comme indiqué sur la figure), régler VR201 (TRKG) jusqu'à ce que le voltmètre CC enregistre 3V ± 0,1V.

• Réglage de Décentrage

- 5. Remettre le bras de pick-up sur la position de repos. (Il retournera automatiquement lorsqu'on le relâche).
- 6. Pour le régler, tourner la vis ❷ dans le sens des aiguilles d'une montre jusqu'à ce que le voltmètre CC enregistre 1,0V ± 0,1V.

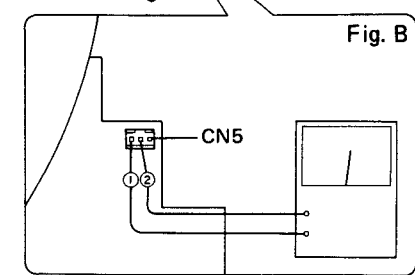
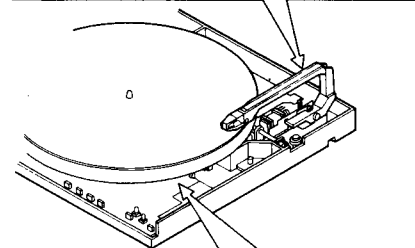
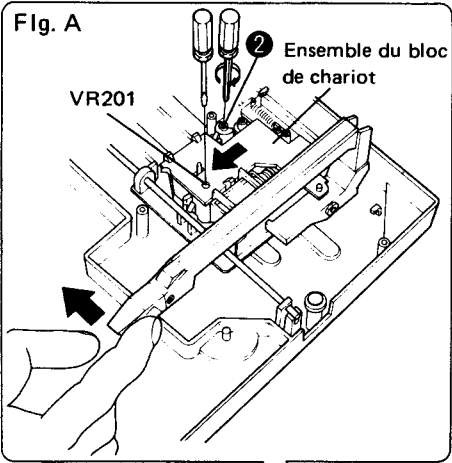


Fig. 11-3 Réglage du déport du senseur de bande

11.3 RÉGLAGE DE LA HAUTEUR DU BRAS DE PICK-UP

- 1. Placer un disque de 30 cm sur le plateau, mettre l'appareil sous tension, et en utilisant le commutateur de location (◀◀), déplacer le bras de pick-up à environ 100 mm du centre du plateau.
- 2. Tourner la vis ❸ jusqu'à ce que le bout de l'aiguille soit à 5 à 7 mm au-dessus de la surface du disque.
- En tournant la vis dans le sens des aiguilles d'une montre, abaisser l'aiguille.
- En tournant la vis dans le sens contraire des aiguilles d'une montre, soulever l'aiguille.

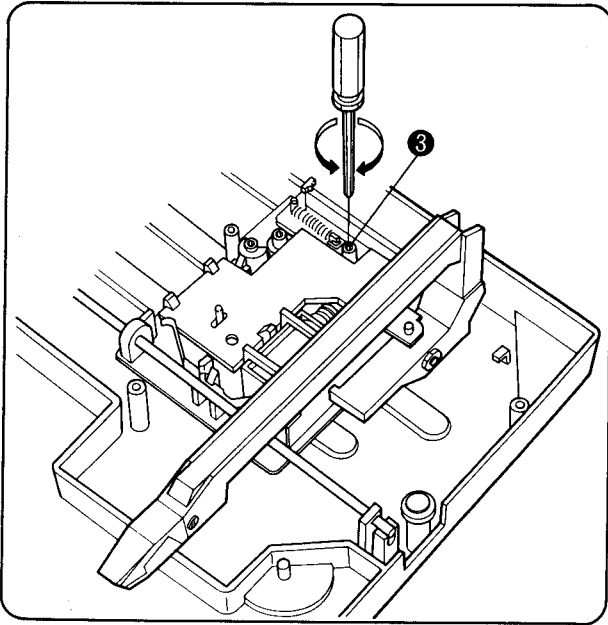
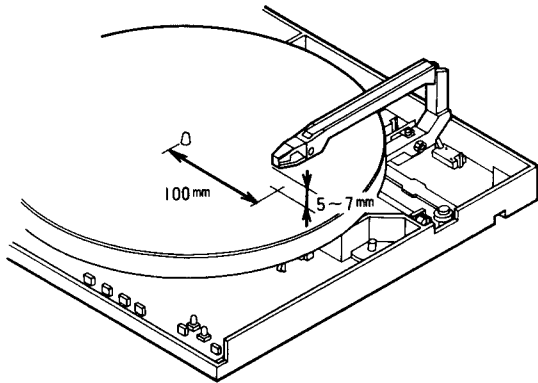


Fig. 11-4 Réglage de la hauteur de la point de lecture

11.4 REGLAGE DE LA VITESSE DU MOTEUR DE LA PLATINE DE LECTURE

1. Mettre l'appareil sous tension avec le stroboscope branché sur la platine de lecture et tourner le commutateur de positionnement pour mettre le moteur de la platine en marche.
2. Introduire un petit tournevis à partir d'en dessous du panneau, à travers l'orifice de réglage de la vitesse, afin de régler la vitesse 45 tours/minute (VR4) ou celle 33-1/3 tours/minute (VR5).

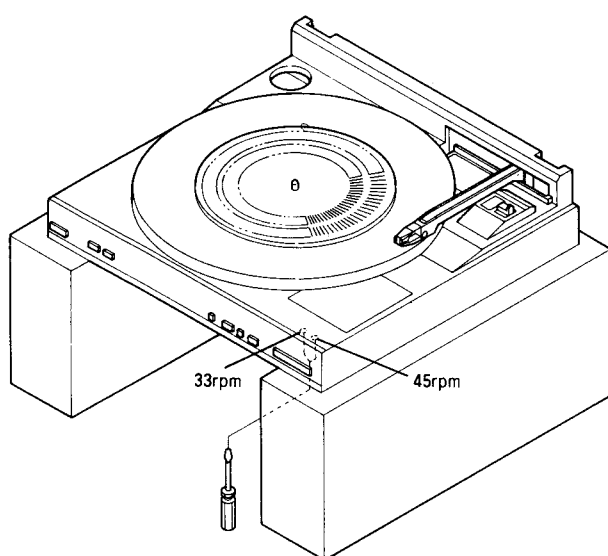


Fig. 11-5 Réglage de la vitesse du moteur du lecteur de disque

11. AJUSTE

El procedimiento de remoción del panel siguiente está requerido para todos los ajustes excepto el ajuste de velocidad.

● **Extracción del panel (requerida antes de poder realizar ajustes)**

1. Coloque el brazo fonocaptor en el surco inicial del disco.
2. Retire el plato.
3. Coloque el brazo fonocaptor sobre la sección ranurada para remover el panel, manualmente o usando el interruptor de localización del brazo fonocaptor (▶▶) (ver la figura 11-1).
4. Después de remover los 8 tornillos de fijación ❶, levante la sección posterior del conjunto del panel, retire el conjunto del brazo fonocaptor de la sección ranurada; luego retire el conjunto del panel levantando y sacándolo hacia adelante.
5. Posicione de nuevo el brazo fonocaptor y coloque el plato en su posición.

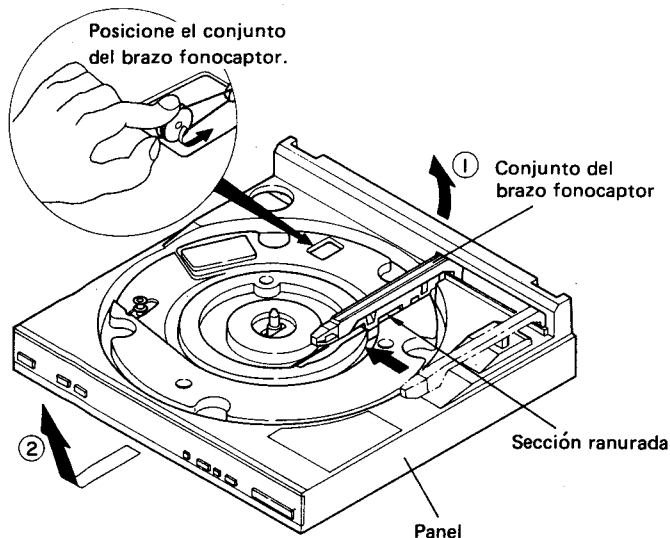


Fig. 11-1 Extracción del panel

11.1 AJUSTE DEL BRAZO DE FONOCAPTOR

1. Con el aparato encendido, ponga un disco de prueba (PLS-4001S, lado A hacia arriba), sobre el plato giratorio.
 2. Presionar el botón PLAY/STOP (reproducción/parada) y verificar la posición del brazo de fonocaptor cuando se posa sobre el disco.
 3. Girar el tornillo ❶ de ajuste hasta que el brazo de fonocaptor quede alineado con el disco.
- Cuando el brazo de fonocaptor descansa a la derecha de la ranura inicial, (cuando la cuenta es menor que la tolerancia de cuenta estándar), girar el tornillo ❶ de ajuste en el sentido contrario a los punteros del reloj.
 - Cuando el brazo de fonocaptor descansa a la izquierda de la ranura de descanso, (cuando la cuenta es mayor que la tolerancia de cuenta estándar), girar el tornillo ❶ de ajuste en el sentido a los punteros del reloj.
 - Cuando se esté usando el disco de prueba, la posición quedará fijada para discos de 30 cm.

Disco de prueba	Posición de ajuste
PLS4001S	13 ± 6 cuentas

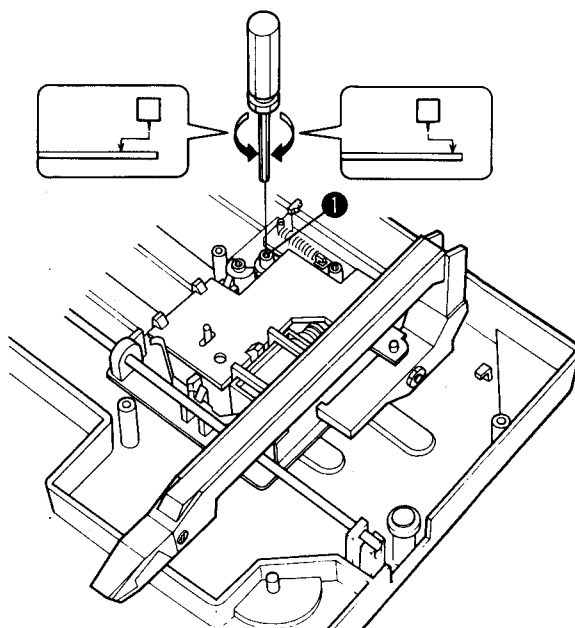


Fig. 11-2 Ajuste de la posición de descenso de la aguja

11.2 AJUSTE DE GANANCIA DEL SENSOR DE SEGUIMIENTO Y DE DESCENTRADO

● Ajuste de Ganancia

1. Sacar la cubierta para el polvo y el plato giratorio.
2. Conectar un voltímetro de C.C. al pasador No.2 (GND) y al pasador No.1 (TRKG) del CN5.
3. Girar el tornillo ② en el sentido contrario a los punteros del reloj y tirar la unidad de carro hacia adelante.
4. Encender el aparato y mientras se empuja el brazo de fonocaptor hacia el centro (como se muestra en la ilustración) ajustar el VR201 (TRKG) hasta que el voltímetro de C.C. registre $3V \pm 0,1V$.

● Ajuste de Descentrado

5. Haga volver el brazo de fonocaptor a la posición de descanso. (Volverá por sí mismo cuando usted lo libere.)
6. Para ajustarlo, girar el tornillo ② en el sentido de los punteros del reloj hasta que el voltímetro de C.C. registre $1,0V \pm 0,1V$.

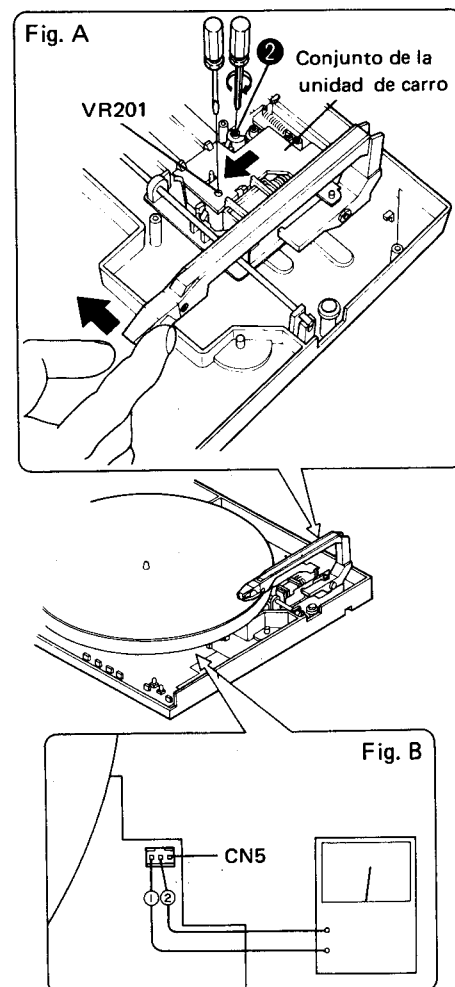


Fig. 11-3 Ajuste de descentramiento del sensor de banda

11.3 AJUSTE DE LA ALTURA DEL BRAZO DE FONOCAPTOR

1. Poner un disco de 30 cm sobre el plato giratorio, encender el aparato, y usando el conmutador de localización (◀▶) mover el brazo de fonocaptor a una distancia de aproximadamente 100 mm del centro del plato giratorio.
2. Girar el tornillo ③ hasta que la punta de la aguja esté de 5 a 7 mm sobre la superficie del disco.
 - Girando el tornillo en el sentido de los punteros del reloj, se baja la aguja.
 - Girando el tornillo en el sentido contrario a los punteros del reloj, se sube la aguja.

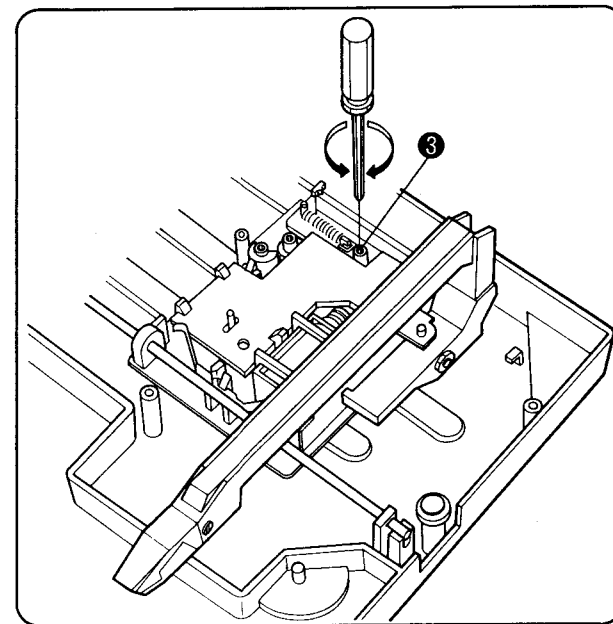
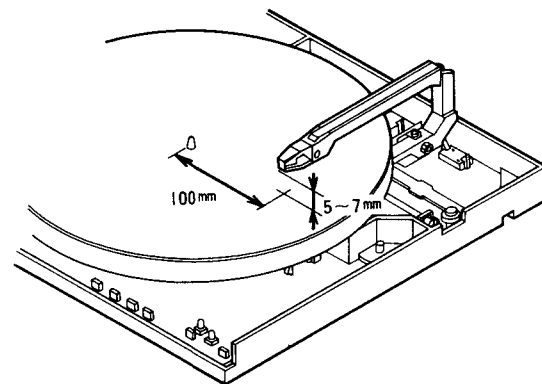


Fig. 11-4 Ajuste de la altura de la aguja

11.4 AJUSTE DE LA VELOCIDAD DEL MOTOR DEL GIRADISCOS

1. Coloque el interruptor de alimentación en "ON" (encendido) con el estroboscopio conectado al sistema giradiscos; luego accione el interruptor de localización para engranar el motor del sistema giradiscos.
2. Inserte un destornillador pequeño partiendo de abajo del panel a través del orificio de ajuste de velocidad, para ajustar la velocidad de 45 rpm (VR4) o la velocidad de 33-1/3 rpm (VR5).

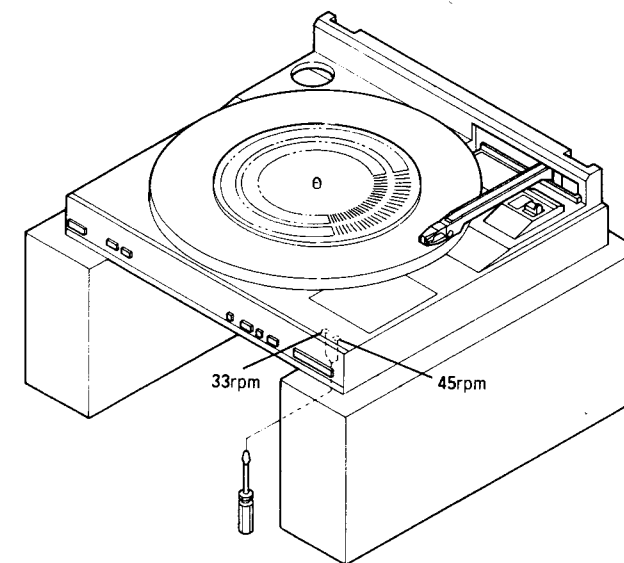
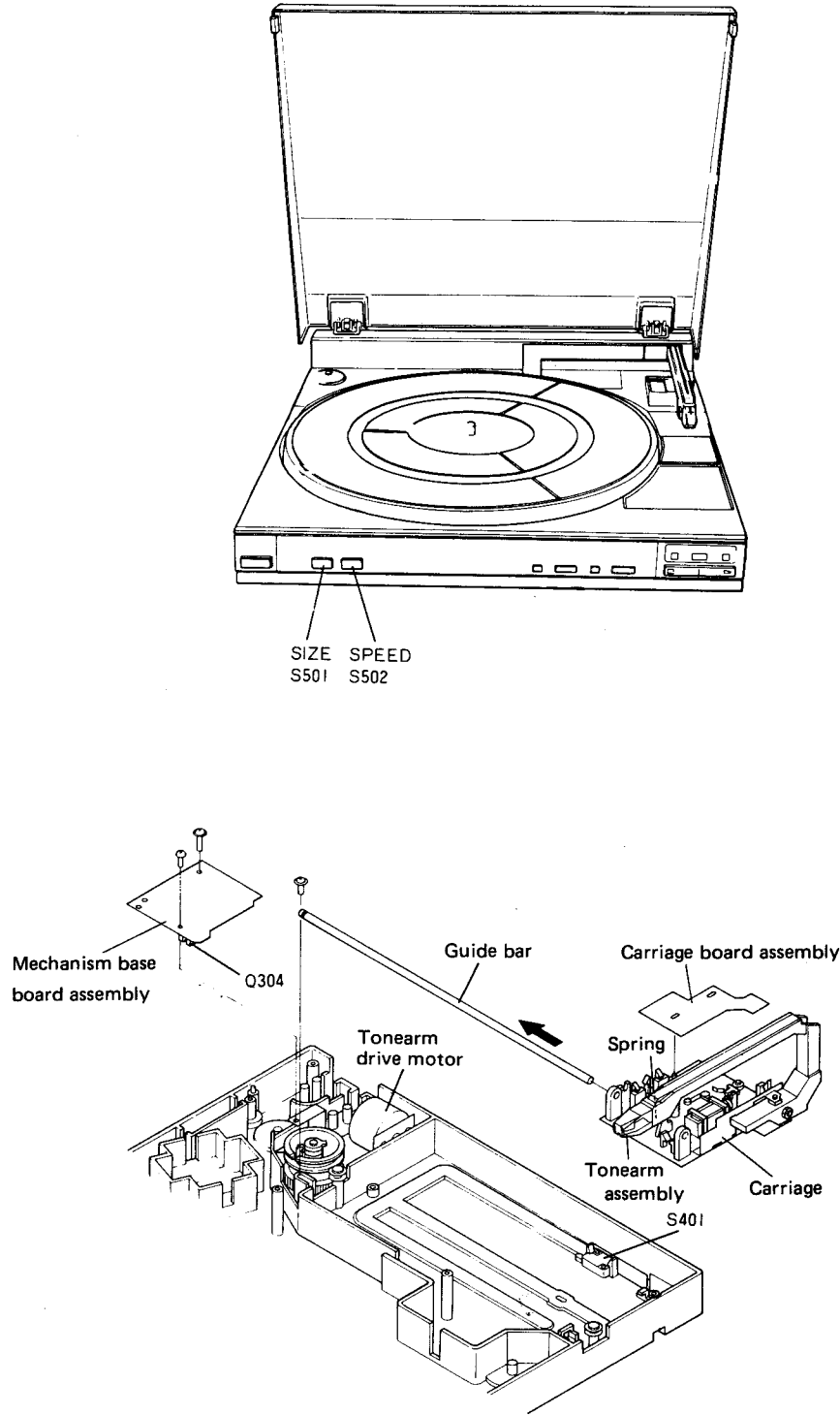
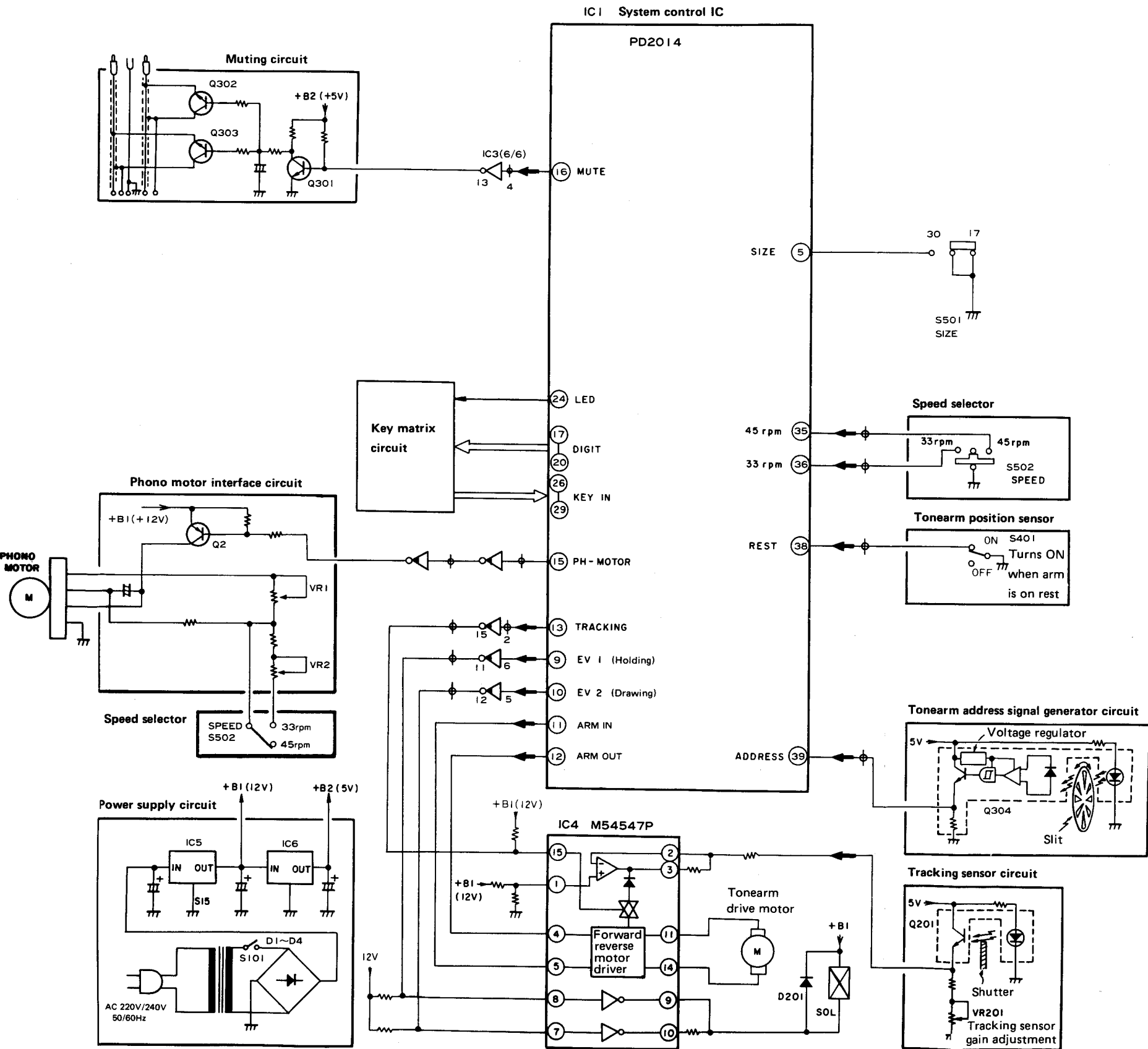


Fig. 11-5 Ajuste de la velocidad del motor del giradiscos

12. BLOCK DIAGRAM



13. CIRCUIT DESCRIPTIONS

13.1 CIRCUIT DESCRIPTIONS

13.1.1 Address Sensor Circuit

The address sensor is located on the mechanism base unit. It detects the position of the tonearm and sends address pulses to the control IC as the tonearm moves. The address sensor is made up of an internal Schmitt trigger circuit photo interrupter and a slit wheel which is synchronized with the carriage. The slit wheel spins when the carriage moves and intermittently cuts off light to the photo interrupter (Q304) in pulses which correspond to the carriage movement. These pulses are counted by the control IC, which detects the distance the carriage moves, the tonearm lowering position and the end of the record. It also registers band addresses.

The address pulses from the photo interrupter work as follows: When the light is cut off, the output is "L," and when the light is not cut off the output is "H." One address signal pulse is approximately equivalent to 0.114 mm of tonearm movement.

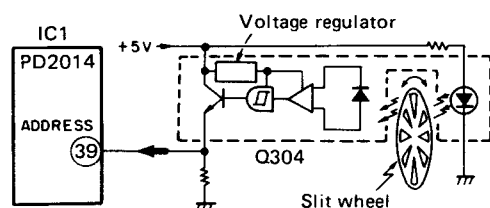


Fig. 13-1 Address Sensor Circuit

13.1.2 Tracking Sensor Circuit

This circuit detects tracking errors by means of a shutter which is synchronized with the tonearm and a photo interrupter.

The tracking sensor is made up of a shutter synchronized with the tonearm and a photo interrupter which is mounted onto the carriage base board. When the tonearm lowers and begins tracing the record surface the tonearm tracking errors increase as the number of rpms increases. When tracking errors increase, the shutter, which is synchronized with the tonearm, also moves and the light cut-off rate of the photo interrupter changes. Subsequently, the output of the photo interrupter changes and is sent to the tonearm drive unit in the form of tracking error signals.

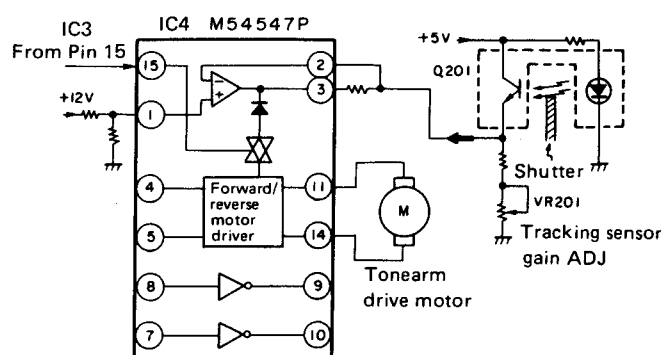


Fig. 13-2 Tracking sensor circuit

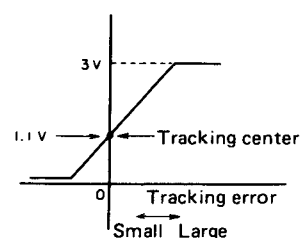
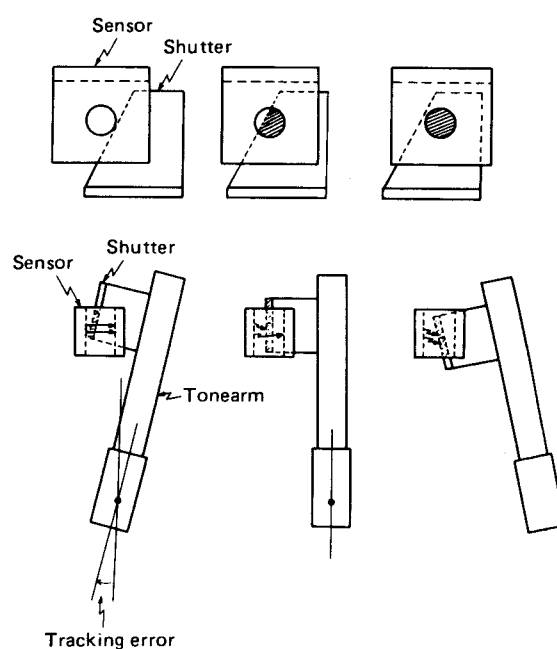


Fig. 13-3 Detection of tracking errors

13.1.4 Elevation and Tonearm Circuit

The tonearm drive motor and EV solenoid are controlled by commands from the control IC (IC1), which also controls the horizontal and vertical movement of the tonearm. In addition to this, the IC controls tonearm tracking with the tracking sensor and tracking error signals.

• EV solenoid drive

The EV solenoid drive uses a large current at first to draw the plunger inside, and thereafter uses a lower current for holding the plunger in.

The signal to draw the plunger inside comes from the control IC (IC1), passes through the IC3 transistor array, and enters IC4 pin 7. This signal turns on the IC Darlington transistor, and approximately 170mA of current runs into the collector, turning on the EV solenoid which draws the plunger inside. Because of this, the tonearm will drop slightly. This “draw” signal from the control IC lasts about 1second. Next, the hold signal, which was output at the same time as the draw signal, passes through the IC3 transistor array, enters IC4 pin 8 and turns on the Darlington transistor. When the draw signal ends, a current of approximately 70mA drawn from pin 9 holds the plunger inside, which keeps the tonearm elevation down until the hold signal ends.

• Tonearm drive

The tonearm drive is controlled by input to IC4 pin 4, pin 5 and pin 15. Their truth values are shown in Fig. 13-6.

• Lead-in (locate-in)

IC4 receives locate-signals from the control IC (IC1), and with an output of approximately 0V from IC4 pin 14 (O1) and approximately 11V from pin 11 (O2), the tonearm motor begins turning in the lead-in direction.

• Lead-in (locate-out)

IC4 receives locate-out signals from the control IC (IC1), and with an output of approximately 11V from pin 14 and approximately 0V from pin 11, the tonearm motor begins turning in the lead-out direction.

• Stop

IC4 receives stop signals from the control IC (IC1), and with an output of approximately 11V from both pin 14 and pin 11, stops the tonearm motor.

• Tracking

IC4 receives tracking signals from the control IC (IC1), and between pin 14 and pin 11, outputs an amplified tracking error signal (amplified by an internal OP amplifier) and begins turning the tonearm drive motor in such a way as to correct the error.

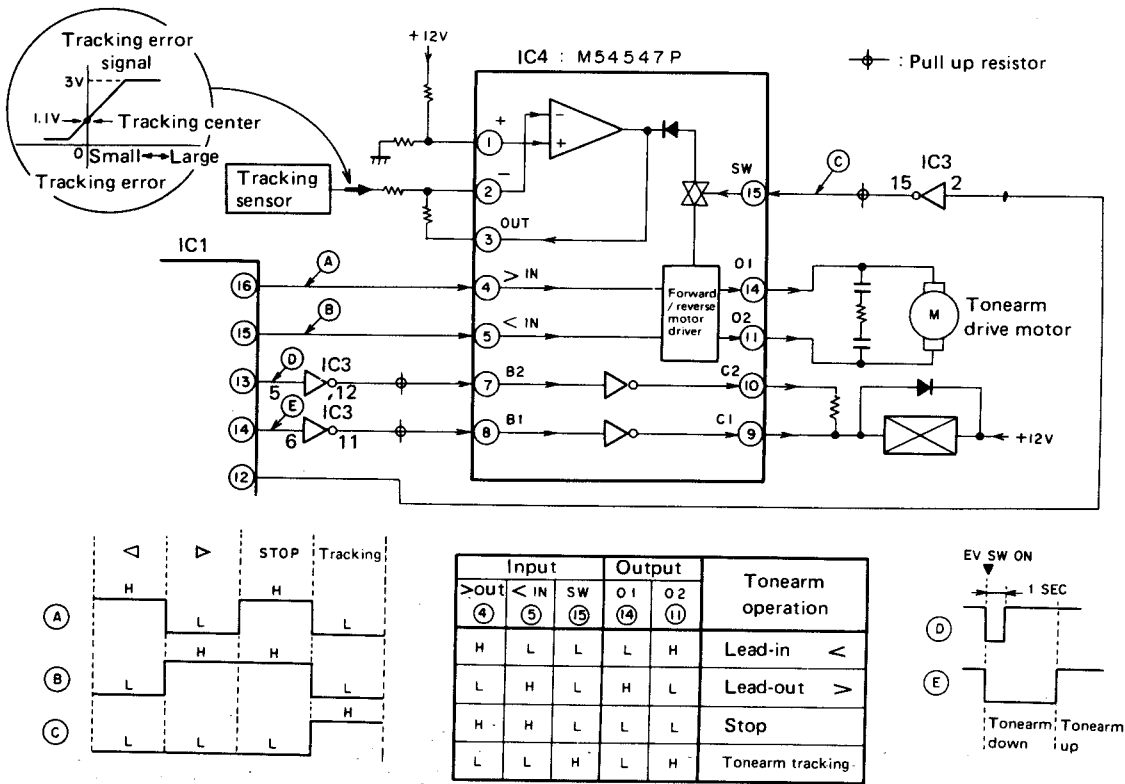


Fig. 13-6 Elevation and Tonearm Drive Circuit and I/O Truth Value Chart

13.1.5 Key Matrix Circuit

The key matrix circuit reads the digit output (pins 17 to 20) of the control IC (IC1) from the Key IN terminal (pins 26 to 29) and distinguishes different key input signals with the control IC. In addition to carrying out key input operations, it

light LEDs with output from pins 17 to 19. Fig. 13-8 shows the output waves produced by switch matrix input in the following order: REP SW, Program SW 7, and EV SW.

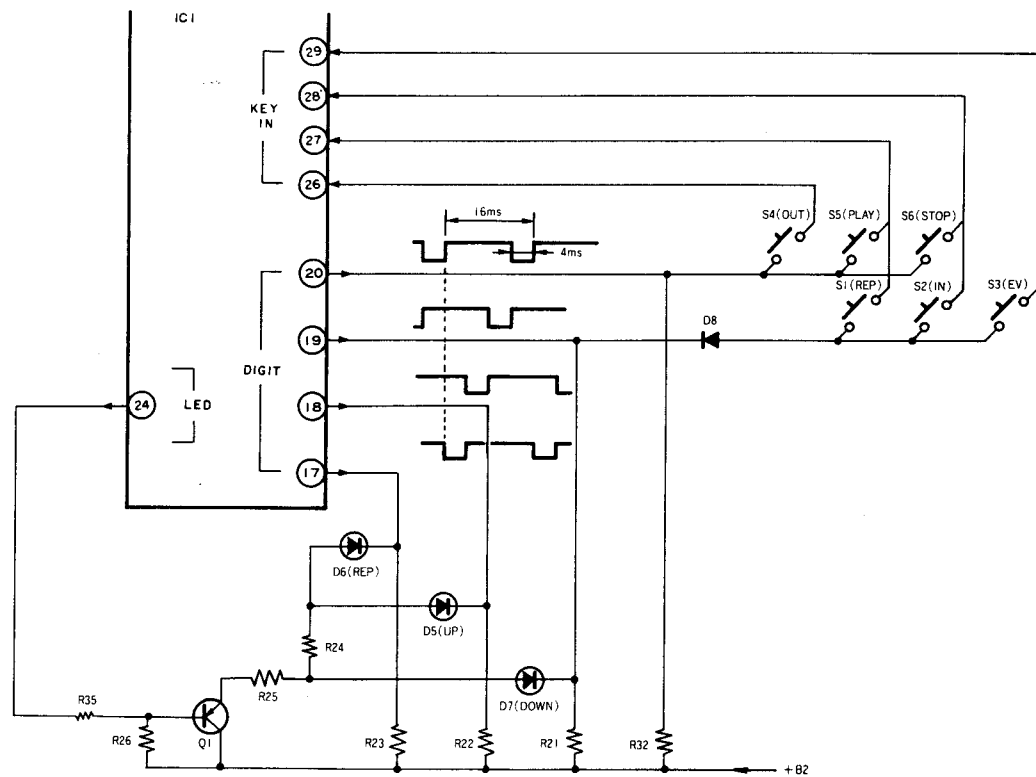


Fig. 13-7 Key Matrix Circuit

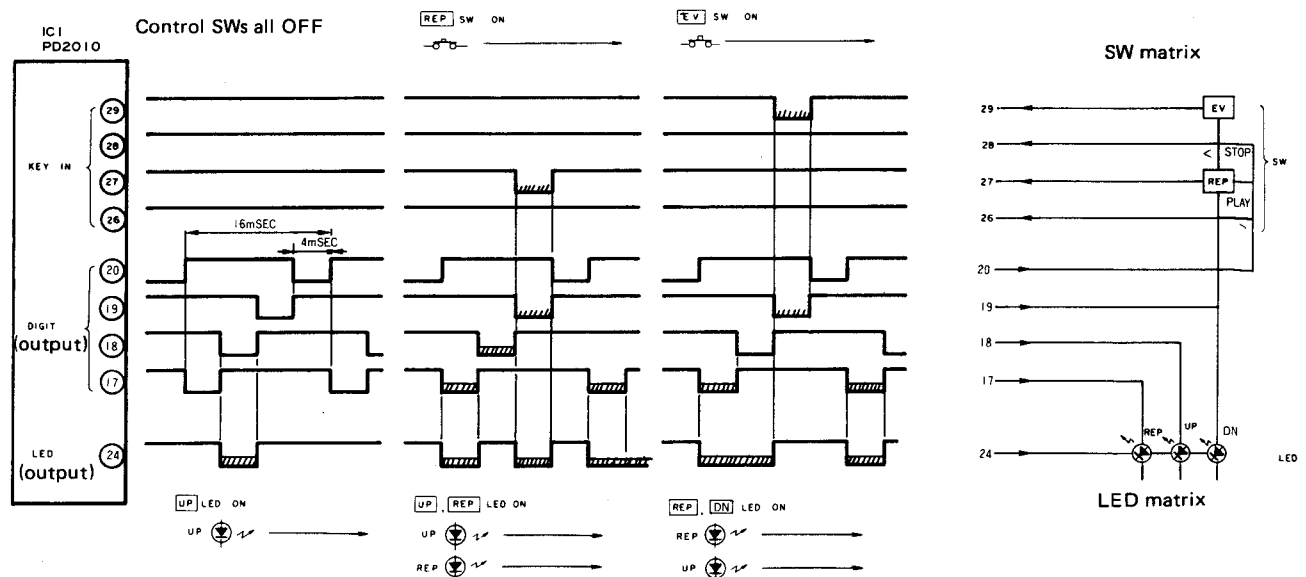


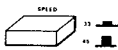
Fig. 13-8 Output Waveforms Produced by Key input

13.2 DESCRIPTION OF OPERATION

13.2.1 Power-On Reset

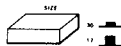
- Returns the tonearm to the rest.
- Only the UP light is on and all others are off (The UP light blinks while the arm is moving).
- Turntable stops.

13.2.2 Speed Switch (Push-lock SW)



Enables push-switch selection of 33-1/3 rpm or 45 rpm record speeds.

13.2.3 Size Switch (Push-lock SW)



Enables push-switch selection of 30 cm or 17 cm record sizes.

13.2.4 Repeat Switch (Momentary contact SW)



This switch engages or disengages repeat play. It can be used any time. It toggles between ON and OFF with successive pressing.

When the Repeat ON command is received after play has ended or when the tonearm is returning to rest after the Stop SW has been pressed, repeat play is engaged for the next play selection; however, the current play just finished will not be repeated — the tonearm remains on the rest.

When the Repeat ON command is received in any condition except when the tonearm is on the rest, the tonearm first goes to the armrest after the 1st play is completed and then returns to the lead-in groove to begin play again.

13.2.5 UP, DOWN SW (Momentary contact SW)



This switch raises and lowers the tonearm. It may be engaged when the tonearm is all the way up, when the tonearm is tracking a record, or when the tonearm is moving down. When the tonearm is all the way up, the switch can move the tonearm down only; and when the tonearm is tracking a record or moving down, the switch can raise the tonearm only.

13.2.6 Play Switch (Momentary contact SW)



This switch is used to begin fully automatic play and may also be used to restart play from the lead-in groove during automatic play.

- If the tonearm is on the armrest, automatic play begins.
- This switch may be engaged while the tonearm is returning to the armrest after the Stop Switch has been pressed. If so, automatic play begins after the tonearm returns to the armrest.
- If this switch is engaged while the tonearm is raised, the tonearm is placed in “down tracking mode”.

13.2.7 STOP SW (Momentary contact SW)



This switch is used to stop either automatic play or manual play, and clear the Repeat command. It can be used at any time.

- When the tonearm is not on the armrest, automatic play will stop, the repeat command is cleared, and the tonearm is returned to the armrest. When the tonearm is on the armrest, the Repeat command is cleared.

13.2.8 ◁, ▷ SW (Momentary contact SW)



This switch is used to position the tonearm during either automatic play or manual play.

- ◁ SW... The tonearm is lifted up and moved toward the center of the record (to approx. $\phi 106$ mm).
- ▷ SW... The tonearm is lifted up and moved toward the outside edge of the record. (to the armrest)
- When the tonearm is on the armrest, only ◁ SW is used and manual play begins.
- It is used at the completion of UP, during DOWN, and during tracking. After completion of UP operation, the locate operation is executed.

13.3 DESCRIPTION OF OPERATION MODES

The PL-X420 features the following operation modes:

- 1) Power-on reset
- 2) Rest mode
- 3) Lead-out mode
- 4) Lead-in mode
- 5) Down-tracking mode
- 6) Return mode
- 7) Up mode
- 8) Locate mode

13.3.1 Power-On Reset

When the power is turned on, the PL-X420 executes the following operations with corresponding indications:

- Tonearm is returned to armrest.
- Repeat display is turned OFF, and UP display only is turned on. (UP indication blinks while the tonearm is moving.)
- Phono motor rotation is stopped.
- Muting is turned on.

13.3.2 Rest mode

When the tonearm returns to the rest, operation switches to input wait status (rest mode) and the PL-X420 engages all the switches with the exception of the EV SW and \triangleright SW.

1. Repeat SW . . . This switch turns the repeat function ON and OFF alternately.
2. \triangleleft SW . . . This switch rotates the turntable platter and moves the tonearm toward the center of the record (locate mode).
3. Play SW . . . This switch rotates the turntable platter and begins automatic play (lead-in mode)
4. Stop SW . . . This switch clears the repeat function.

13.3.3 Lead-Out Mode

• During fully automatic play

This switch moves the tonearm toward the outside edge of the record until it reaches the first selection. The tonearm stops moving at that time and operation switches to down-tracking mode.

In this mode, both the Repeat SW and Stop SW are functional.

- 1) Repeat SW . . . This switch turns the repeat function ON and OFF alternately.
- 2) Stop SW . . . This switch clears the repeat function and starts the return operation (return mode).

13.3.4 Lead-In Mode

• During fully automatic play

Play SW switch switches to lead-in mode from rest mode, causing the tonearm to begin moving to the center of the record (turntable is ON).

SIZE SW is functional in 30 cm area $+7.7$ mm, -1.8 mm (landing position). If SIZE SW is turned ON (30 cm) when the tonearm is in this area, the tonearm moves 30 cm then $+7.2$ mm closer to the center of the record; then operation switches to lead-out mode. Once SIZE SW is pressed, it is not functional again until play has stopped.

If SIZE SW is set to 17 cm and tonearm is in 30 cm $+7.2$ mm, -1.8 mm (landing position), the tonearm moves 17 cm then $+7.2$ mm closer to the center of the record, then operation switches to lead-out mode.

As in lead-out mode, the Repeat and Stop switches are both functional in this mode and the operation of these switches is the same as in lead-out mode.

13.3.5 Down-Tracking Mode

This switch turns off the UP LED and turns ON the DOWN LED. The tonearm is moved down to begin tracking. After a period of 1.8 second have elapsed since the tonearm was moved down, muting is turned off. When the position of the tonearm is within $\phi 125$ during tracking, the end detection operates. When the end of the record is detected, operation switches to return mode.

- 1) Repeat SW . . . This turns the repeat function ON and OFF alternately.
- 2) EV SW . . . Switches to UP mode.
- 3) \triangleleft SW . . . Switches to UP mode and after completion of UP operation, the operating status switches to locate mode.
- 4) \triangleright SW . . . Switches to UP mode, and after completion of UP operation, the operating status switches to locate mode.
- 5) Play SW . . . For fully automatic play, operation switches to lead-out mode to restart play. This operation is not applicable for manual play.
- 6) Stop SW . . . This switch clears the repeat function and switches to return mode.

13.3.6 Return Mode

If the tonearm is DOWN, it is raised UP and if completion of UP operation is detected after one second has elapsed, turntable rotation is stopped and the tonearm is brought to the armrest.

The Repeat switch is functional along with the following operations:

• Normal return

Play SW, Stop SW and Repeat SW are functional.

1. Repeat SW . . . This switch alternately turns the repeat function ON and OFF.
2. Play SW . . . After the tonearm returns to the armrest, operation switches to lead-in mode for fully automatic play.
3. Stop SW . . . This switch clears the play or repeat operation during return mode.

• Repeat return

Repeat SW and Stop SW are functional.

1. Repeat SW . . . This switch alternately turns the Repeat function ON and OFF.
2. Stop SW . . . This switch clears the Repeat function and switches to a normal return operation.

13.3.7 UP mode

This mode lights the UP LED, turns ON muting and raises the tonearm. After 1.7 seconds have elapsed since the UP operation was initiated, the UP operation is completed by the timer. This switch is functional when the tonearm is in a raised position or being lifted UP.

All switches are functional.

1. Repeat SW . . . This switch turns the Repeat function ON and OFF alternately.
2. EV SW . . . This switch is not functional when the tonearm is being raised. Operation switches to down-tracking mode when the tonearm is UP.
3. ◁ SW . . . This switch is not functional when the tonearm is being raised. Operation switches to locate mode when the tonearm is UP.
4. ▷ SW . . . This switch is not functional when the tonearm is being raised. Operation switches to locate mode when the tonearm is UP.

5. Stop SW . . . This switch clears the Repeat function and operation switches to return mode.

6. Play SW . . . This switch is not functional when the tonearm is being raised. Operation switches to down-tracking mode when the tonearm is UP.

13.3.8 Locate Mode

This mode is part of the UP mode and is engaged when the ◁ or ▷ switch is held down during manual or fully automatic play.

1. When the ◁ SW is pressed, the tonearm moves toward the center of the record until it reaches the position corresponding to $\phi 106$, at which time the time it stops. The ▷ SW is not functional then.
2. When the ▷ switch is pressed, the tonearm moves toward the outer edge of the record. It stops at the armrest and the ▷ switch is not functional in that position.

Because the PL-X420 key matrix system is used, simultaneous pressing of multiple keys is not allowed. If this occurs. The locate operation stops.

When the ◁ or ▷ switch is not pressed, tonearm movement stops and operation switches to normal UP mode.

Possibility of SW input in each mode.

• Full Automatic Play Mode

MODE \ SW	REP	◁	EV	▷	PLAY	STOP
Rest	○	○ <small>Note 2</small>	×	×	○	○
Lead-out	○	×	×	×	×	○
Lead-in	○	×	×	×	×	○
Down trace	○	○	○	○	○ <small>Note 1</small>	○
Return	○	×	×	×	○	○
Up	○	○	○	○	○	○
Rokate	✱	✱	✱	✱	✱	✱

✱ Prohibit pushing twice

Note 1. REPLAY

Note 2. switch to manual

• Manual Play Mode

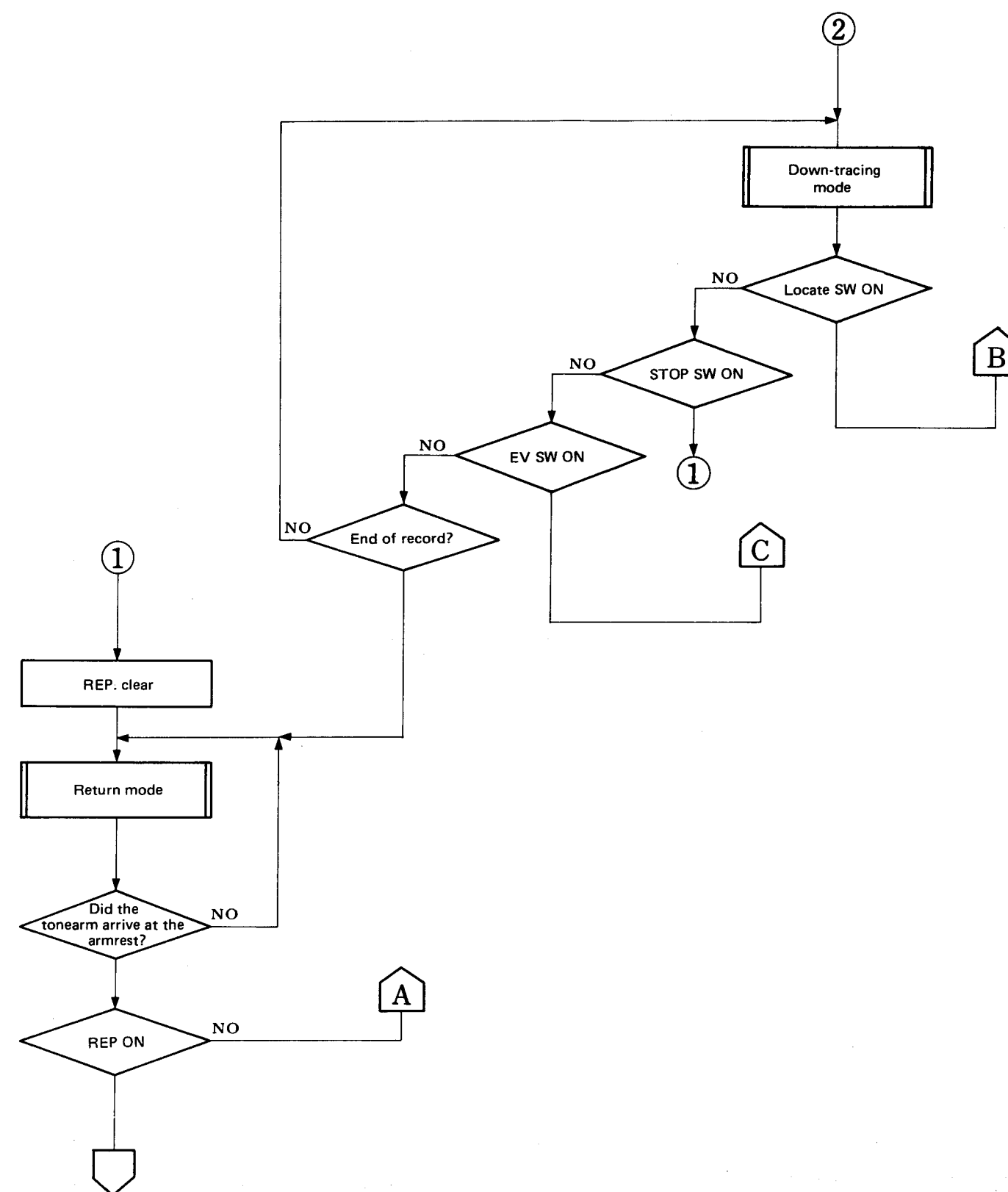
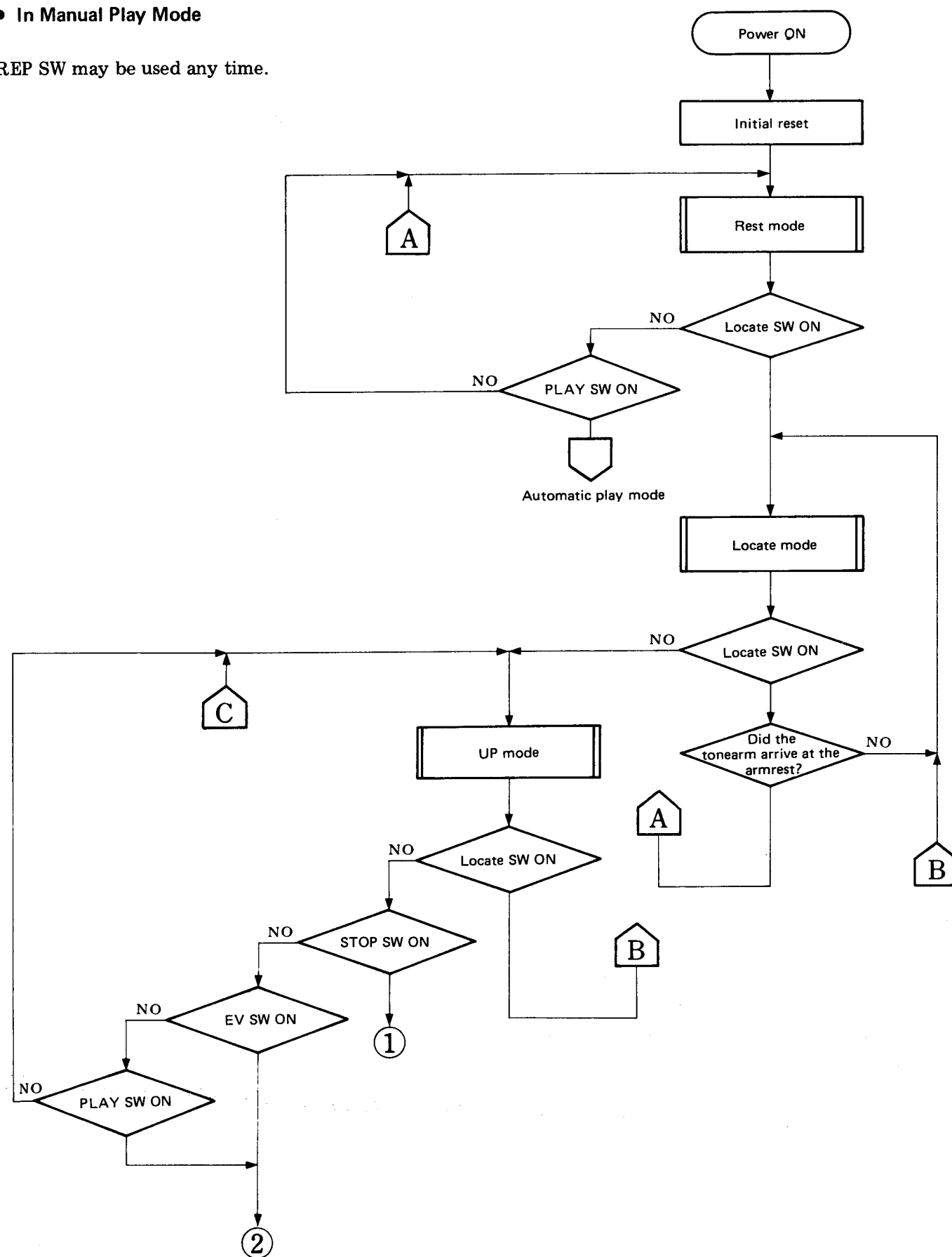
MODE \ SW	REP	◁	EV	▷	PLAY	STOP
Rest	○	○	○	×	○ <small>Note 1</small>	○
Down trace	○	○	○	○	×	○
Return	○	×	×	×	○ <small>Note 1</small>	○
Up	○	○	○	○	○	○
Rokate	✱	✱	✱	✱	✱	✱

✱ Prohibit pushing twice

Note 1. switch to fully automatic.

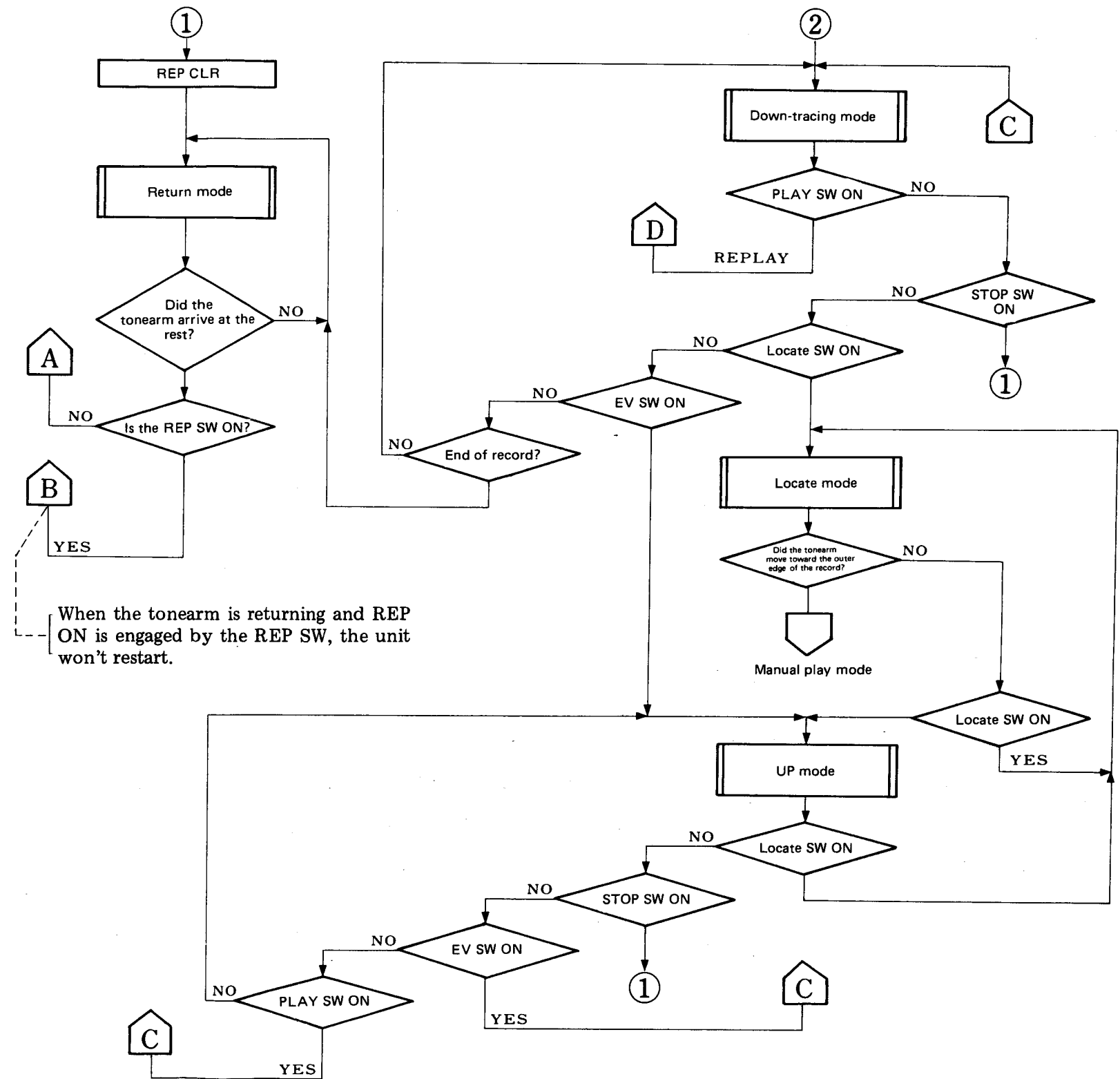
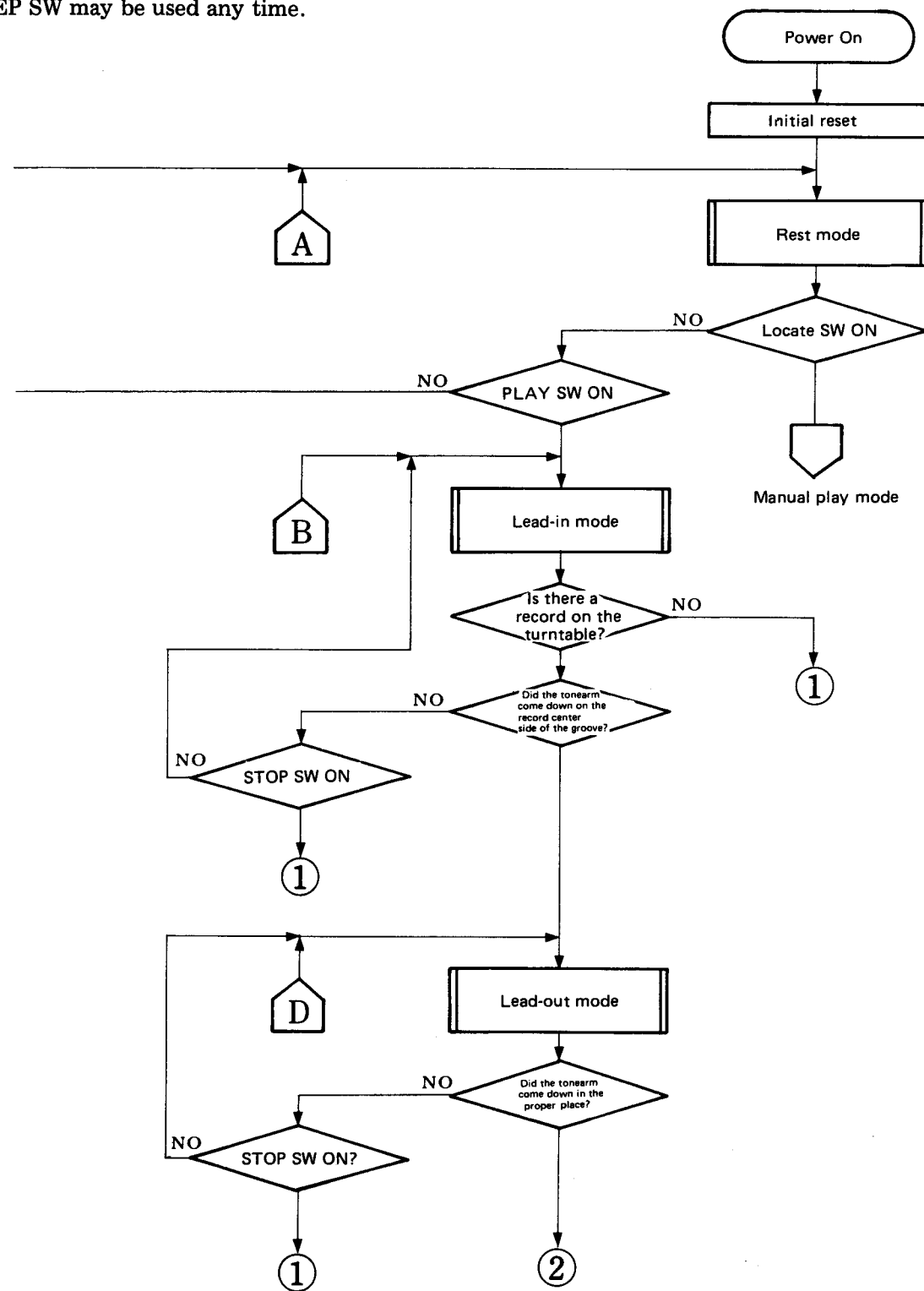
• In Manual Play Mode

REP SW may be used any time.

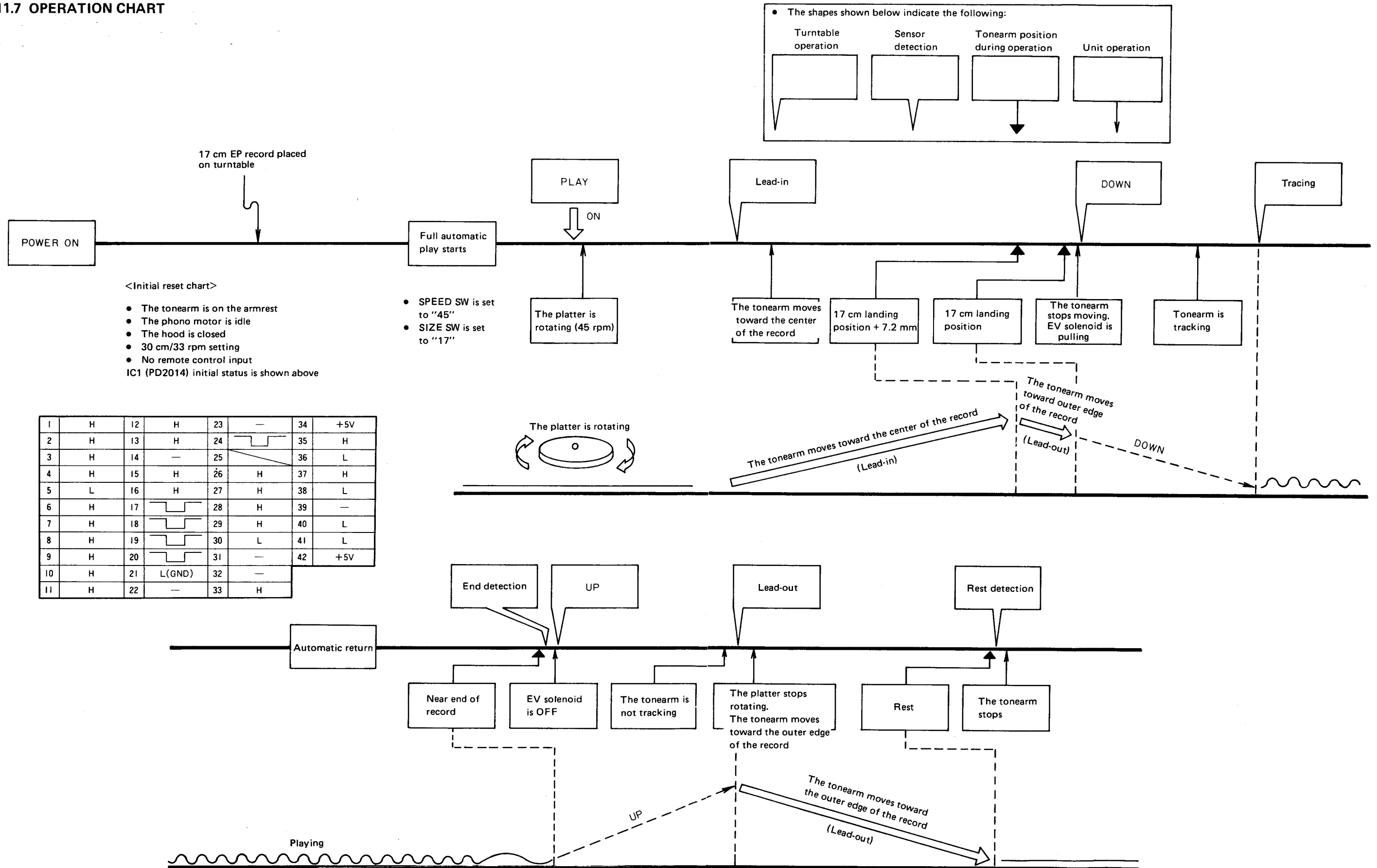


● In Full Automatic Play Mode

REP SW may be used any time.



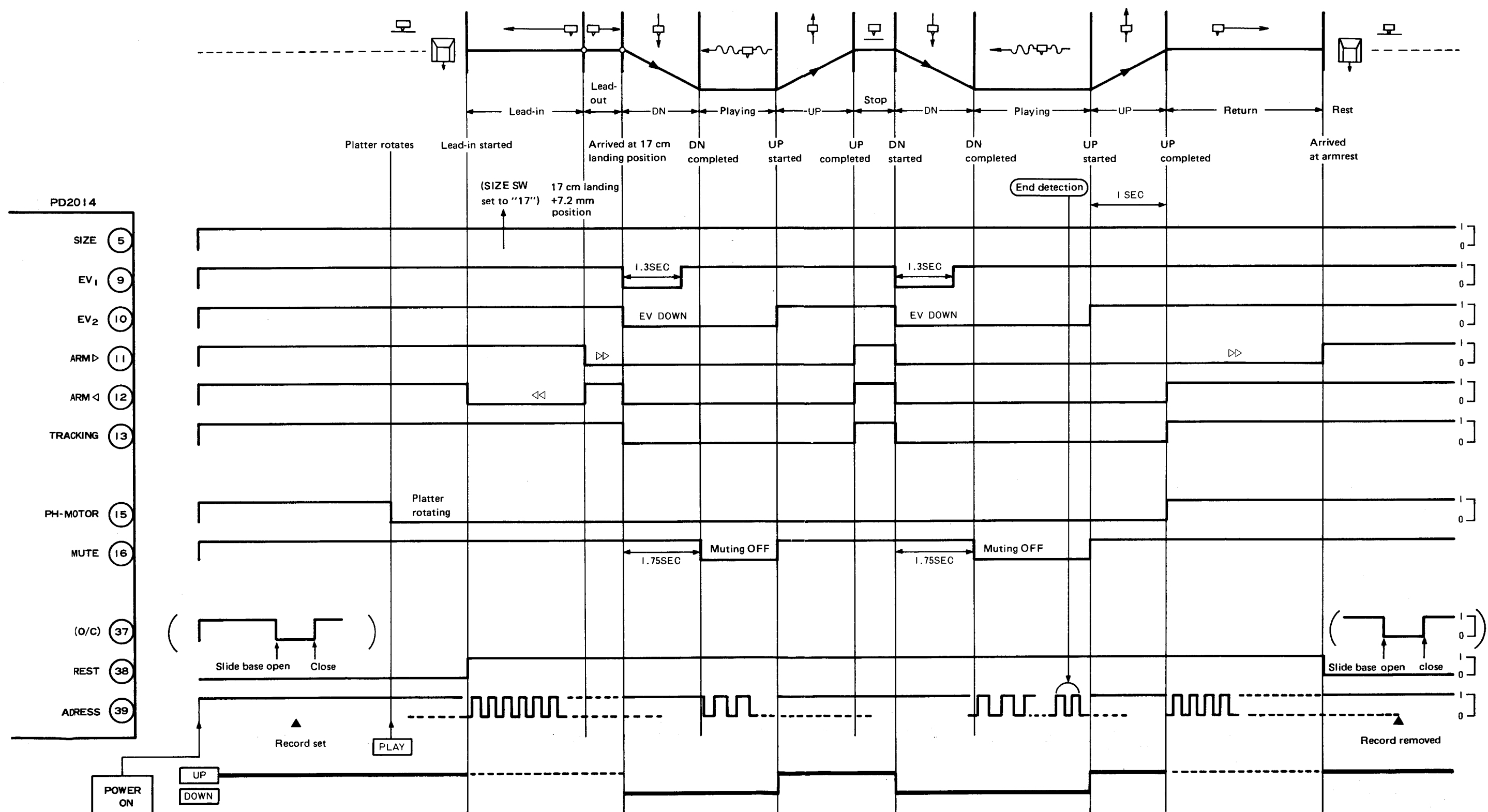
11.7 OPERATION CHART



PL-X420[BK] 17 cm EP record Full automatic play operation → one play cycle

SPEED SW is set to "45"

SIZE SW is set to "17"



Pin Description (PD2014)

PIN No.	Mnemonic	I/O	Signal Type	Description	Comments
1	R40	Input	REM IN	Decodes L3 signal input from decode microcomputer	Waiting input status is "H"
2	R41	Input	REM IN	Decodes L2 signal input from decode microcomputer	
3	R42	Input	REM IN	Decodes L1 signal input from decode microcomputer	
4	R43	Input	REM IN	Decodes L0 signal input from decode microcomputer	
5	R50	Input	Size	30-cm record detection No 30-cm record detected	PL-X420...30/17
6	R51	Input	Search	Selection search input between audio selections during UP search	PL-X420...(NC)
7	R52	Input	Z-Cross	Band sensor zero cross input (center between selection) zero cross	PL-X420...(NC)
8	R53	Input	Band	Band sensor between selections input (between selections while tracking)	PL-X420...(NC)
9	R60	Output	EV ₁ (drawing)	Tonearm EV drive output (drawing rod in)	Drawing time, 1 second
10	R61	Output	EV ₂ (holding)	Tonearm EV drive output (holding rod in)	
11	R62	Output	Arm In	Tonearm motor drive output (movement toward center of record)	
12	R63	Output	Arm Out	Tonearm motor drive output (movement toward outer edge of record)	
13	R70	Output	Tr kg	Tonearm tracking	
14	R71	Output	33/45	Phono motor 33/45 switch output	PL-X420...(NC)
15	R72	Output	PH-Motor	Phono motor start/stop output	
16	R73	Output	Mute	Muting ON/OFF output	
17	P10	Output	Digit	KEY LED matrix output	
18	P11	Output	Digit	KEY LED matrix output	
19	P12	Output	Digit	KEY LED matrix output	
20	P13	Output	Digit	KEY LED matrix output	
21	Vss	—	Power	GND	
22	P20	Output	LED out	LED matrix output	PL-X420...(NC)
23	P21	Output	LED out	LED matrix output	PL-X420...(NC)
24	P22	Output	LED out	LED matrix output	
25	P23		(NC)	Tied to Ground	
26	K00	Input	Key In	KEY matrix input	
27	K01	Input	Key In	KEY matrix input	
28	K02	Input	Key In	KEY matrix input	
29	K03	Input	Key In	KEY matrix input	
30	TEST	—	—	Tied to Ground	
31	Xin	Input	—	Terminal with built-in clock oscillator to interface with external circuits	Ceramic generation
32	Xout	Output	—	Terminal with built-in clock oscillator to interface with external circuits	"4.0MHz"
33	Reset	Input	—	Initialize input 6 μ s, min. "L"	"H" during operation
34	V _{HH}	—	Power	for +5V RAM	
35	R80	Input	45rpm	33/45 speed switch 45 input	AUTO SPEED is set to
36	R81	Input	33rpm	33/45 speed switch 33 input	"H" for both
37	R82	Input	O/C		(5V)
38	R83	Input	Reset	Reset SW input	
39	R90	Input	Address	Address sensor input	
40	R91	Input	Land	Input of detection of tonearm down completion	PL-X420...(GND)
41	R92	Input	Mode	P-126/P-145 switching	
42	V _{DD}	—	Power	+5V	

*1 — *3 denote lines with internal pullup resistors of the following values: *1 = 5 kohms *2 = 100 kohms *3 = 300 kohms

14. FOR WB TYPE

The PL-X420 (BK)/WB type is the same as the PL-X420 (BK)/WEM type with the exception of the following section.

Mark	Symbol & Description	Part No.		Remarks
		PL-X420(BK)/WEM	PL-X420(BK)/WB	
⚠	AC power cord	PDG-037	PDG-064	
	Operating instructions (English)	
	Operating instructions (English/German/French/Italian)	PRE1002	...	
	Label	PAL1006	PAL1007	

● WB type

